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Thirty-First Annual Report

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

Louisiana State University
and
Agricultural and Mechanical College

FOR 1919

TO THE GOVERNOR

BY
W. R. DODSON
DIRECTOR

Ramires-Jones Printing Co.
Baton Rouge, La.
1920

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Louisiana State University
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STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge, La.
W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterinarian, Baton Rouge.
A. F. KIDDER, B. S., Agronomist and Ass't. Director, State Station, Baton Rouge.
W. G. TAGGART, B. S., Ass't. Director, Sugar Station, New Orleans.
G. D. CAIN, B. S., Ass't. Director, North Louisiana Station, Calhoun.
J. M. JENKINS, B. S., Superintendent of Rice Station, Crowley.
A. P. KERR, Chief Chemist, in Charge of Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Ass't Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C MORELAD, Ass't Plant Pathologist, Baton Rouge
S. S. WALKER, M. S., Soil Chemist, Baton Rouge.
F. V. EMERSON, Ph. D., in Charge Soil Survey Work, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
N. KOPELOFF, Ph. D., Bacteriologist, Sugar Station, New Orleans.
F. W. ZERBAN, Ph. D., Chemist, Sugar Station, New Orleans.
W. P. DENSON, B. S., Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
SAM BYALL, B. S., Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
JOE H. JOLLY, B. S., Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
E. C. THOMAS, M. S., Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
C. R. HUMMEL, Clerk and Stenographer, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
R. P. SWIRE, A. B., Treasurer, Baton Rouge.
R. C. CALLOWAY., B. S., in Charge of Dairy, Baton Rouge.
J. K. McHUGH, Stenographer, Sugar Station, New Orleans.
MRS. RUTH HEIDELBERG, Secretary to the Director, Baton Rouge.
GEORGE CHOWNS, Mailing Secretary, Baton Rouge.

330225

BATON ROUGE, LA., December 31, 1919.

To His Excellency, Ruffin G. Pleasant,
Governor of Louisiana.

SIR:

I have the honor to submit herewith, the annual report of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the year 1919.

As required by act of the National Congress of March 2, 1887, providing Federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional funds for research work at the experiment stations of the several states, a financial statement is submitted for the fiscal year beginning July 1, 1918, and ending June 30, 1919.

The financial statement of the Federal appropriations for the fiscal year July 1, 1917, to June 30, 1918, was not published in pamphlet form for general distribution and I am including this report as a supplement hereto.

Very respectfully,

W. R. DODSON.

SUPPLEMENTARY REPORT OF THE HATCH AND ADAMS AND STATE AND FERTILIZER FUNDS.

HATCH AND ADAMS FUNDS.

	Hatch Fund	Adams Fund
Dr.		
Received from the Treasurer of the United States, as per appropriation for fiscal year ending June 30, 1918, under Acts of Congress approved March 2, 1887, (Hatch Fund), and of March 16, 1906, (Adams Fund)	$15.000.00	$15,000.00
Cr.		
Salaries	5,133.25	10,884.25
Labor	3,289.91	444.20
Publications	468.39	....
Postage and Stationery	97.69	201.91
Freight and Express	....	43.33
Heat, Light, Water and Power	....	266.48
Chemicals and Laboratory Supplies	....	1,107.33
Seeds, Plants, and Sundry Supplies	677.69	256.04
Fertilizers	643.18	....
Feeding Stuffs	1,761.68	352.00
Library	....	81.31
Tools, Machinery, and Appliances	1,349.02	99.00
Furniture and Fixtures	2.35	344.50
Scientific Apparatus and Specimens	....	413.87
Live Stock	1,381.95	135.00
Traveling Expenses	4.80	279.08
Contingent Expenses	20.00	....
Buildings and Land	170.09	91.70
Total	$15,000.00	$15,000.00

STATE FUND.

Statement of receipts and expenditures of the State Fund from December 1, 1917, to December 1, 1918:

RECEIPTS:

State Treasurer	$26,541.66	
Refunds	1,156.69	
Sales	7,696.37	
Audubon Sugar Experiment Station Repair Fund	500.00	
Transfer from Fertilizer Fund	8,000.00	
Interest on Daily Balance	298.31	
		$44,193.03

EXPENDITURES:

Salaries	$12,963.80	
Labor	9,424.70	
Publications	499.70	
Postage and Stationery	619.19	
Freight and Express	556.50	
Heat, Water and Light	788.01	
Chemicals	22.10	
Seeds and Sundry Supplies	2,257.80	
Fertilizer	498.70	
Feed Stuffs	3,148.37	
Library	51.80	
Tools, Implements and Machinery	1,661.99	
Furniture and Fixtures	181.15	
Live Stock	2,243.62	
Traveling Expenses	2,403.05	
Contingent Expenses	961.20	
Rent on Land	2,250.00	
Building and Repairs	2,694.79	
Deficit December 1, 1917	560.56	
	$43,787.03	
Cash on hand December 1, 1918	406.00	
		$44,193.03

FERTILIZER AND FEED STUFFS FUND.

Statement of receipts and expenditures of the Fertilizer and Feed Stuffs Fund from December 1, 1917, to December 1, 1918:

RECEIPTS:

Commissioner of Agriculture	$23,559.26	
Refund	82.83	
Deficit	1,336.68	
		$24,978.77

EXPENDITURES:

Salaries	$10,981.43
Labor	1,219.59
Postage and Stationery	422.88
Freight and Express	227.27
Heat, Water and Light	676.16
Chemicals	934.34
Seeds and Sundry Supplies	209.78
Furniture and Fixtures	80.83
Library	52.85
Apparatus	214.29

Traveling Expenses	834.28	
Contingent Expenses	50.06	
Building and Repairs	188.90	
Deficit December 1, 1917	886.11	
	$16,978.77	
Transferred from Fertilizer Fund	8,000.00	
		$24,978.77

FINANCIAL STATEMENT.

The State appropriation for the Experiment Stations is kept in a separate account from that of the Federal funds, as will be shown by the complete financial statement submitted herewith:

HATCH AND ADAMS FUNDS.

	Hatch Fund	Adams Fund
Dr.		
Received from the Treasurer of the United States, as per appropriation for fiscal year ending June 30, 1919, under Acts of Congress approved March 2, 1887 (Hatch fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
Salaries	$ 7,664.12	$11,208.58
Labor	3,825.73	509.00
Publications	268.38	....
Postage and Stationery	155.95	100.81
Freight and Express	108.06	61.68
Heat, Light and Water	2.40	644.89
Chemicals and Laboratory Supplies	.75	1,022.66
Seeds, Plants and Sundry Supplies	42.50	258.51
Fertilizers	291.75	....
Feeding Stuffs	1,155.00	239.15
Library	314.75	99.00
Tools, Machinery and Appliances	12.70	....
Furniture and Fixtures	3.00	223.25
Scientific Apparatus and Specimens	166.70	53.58
Live Stock	589.40	....
Traveling Expenses	132.72	578.89
Contingent Expenses	....	....
Buildings and Land	265.59	....
Total	$15,000.00	$15,000.00

STATE FUND.

Statement of receipts and expenditures of the State Fund from December 1, 1918, to December 1, 1919:

RECEIPTS:

State Treasurer	$22,458.34	
Refunds	1,186.17	
Sales	8,845.43	
Interest on Daily Balance for Six Months	66.58	
Audubon Park Repair Fund	1,000.00	
Cash on Hand December 1, 1918	406.00	
Deficit December 1, 1919	6,432.48	
		$40,395.00

EXPENDITURES:

Salaries	$10,764.78	
Labor	11,312.36	
Publications	616.68	
Postage and Stationery	350.24	
Freight and Express	195.68	
Heat, Water and Light	541.43	
Chemicals	78.35	
Seeds and Sundry Supplies	1,741.24	
Fertilizers	820.04	
Feeds	4,018.43	
Library	14.63	
Tools, Implements and Machinery	603.94	
Furniture and Fixtures	34.10	
Scientific Apparatus and Specimens	......	
Traveling Expenses	1,806.37	
Live Stock	1,614.90	
Contingent Expenses	2,903.62	
Building and Repairs	1,978.21	
Audubon Park Sugar Station Repair Fund	1,000.00	
		$40,395.00

FERTILIZER AND FEED STUFFS FUND.

Statement of the receipts and expenditures of the Fertilizer and Feed Stuffs Fund from December 1, 1918 to December 1, 1919:

RECEIPTS:

Commissioner of Agriculture	$23,789.51	
Refund	386.37	
		$24,175.88

EXPENDITURES:

Salaries	$12,353.78	
Labor	1,860.66	
Publications	5.70	
Postage and Stationery	403.52	
Freight and Express	135.48	
Heat, Light and Water	731.71	
Chemicals	3,031.57	
Seeds and Sundry Supplies	220.81	
Library	32.50	
Furniture and Fixtures	40.00	
Building and Repairs	109.70	
Traveling Expenses	422.81	
Contingent Expenses	128.84	
Deficit December 1, 1918	1,336.68	
Cash on Hand December 1, 1919	3,362.12	
		$24,175.88

GENERAL STATEMENT.

The administration of the Experiment Station work during the past year represents a reorganization period, as our work was very seriously interrupted and, in many instances, modified and restricted during the last year of the war. On the whole, however, we have probably suffered less than most of the other experiment stations from changes in the Staff. We have had to discontinue some of the work on account of lack of funds to meet the necessary expenses. The great advance in labor, cost of materials and especially of scientific apparatus and chemicals, and the necessity for increasing, to some extent, the salaries of employees of the Station, has made it necessary for us to abstain from all repairs and improvements except where it was absolutely essential to prevent rapid deterioration.

The Station suffered the serious loss through death, of Dr. F. V. Emerson, in charge of the Geological Department. During the past several years he had accumulated a good deal of data in regard to important agricultural problems, that had not been gotten into final form for publication; and his extensive travels and study gave him good preparation for becoming very helpful in the solution of many of these problems. Some of his work was prepared for publication just before his death, and bulletins will be issued on these subjects as soon as the funds of the Station will permit.

Preliminary plans have been made for the establishment of a branch station to be devoted to fruit and truck crops, to be located in the Florida Parishes. The matter was brought before the people of Tangipahoa Parish in a series of meetings held at eight important points in the Parish, and the Police Jury of that Parish has voted to set aside a fractional tax that will represent a donation of something like $20,000 to $25,000, for the purchase of land and equipment, should such branch station be established by the State.

There is a great field of usefulness open to such a station, and it is sincerely hoped that the next Legislature will see the wisdom of providing funds for inaugurating needed experimental work in fruit and truck crops, where ample equipment and modern scientific aid will be available.

The geographical formation of a portion of the land at Calhoun is such as to give some promise of the existence of oil in that territory, and a lease has been signed with one of the oil companies now operating in that territory, to bore for oil on the Experiment Station grounds. Provision was made in the contract, however, for preventing any interference with the experimental work by the operators.

The cooperative work with the Iberia Live Stock Farm has been continued through the contribution of $1,250 to the State Penitentiary Board for rental of 500 acres of land, on which beef cattle have been grazed, by the Iberia Live Stock Farm. Under this agreement, the Louisiana Experiment Station has participated in the publication of all of the data secured through beef cattle feeding experiments, conducted at the Iberia Farm. Much valuable data has been secured through these experiments, that will shortly be ready for publication.

The lease on farm lands near the Experiment Station, on which we have conducted some experiments with farm crops, has been discontinued, and it is planned to transfer these experiments to the college farm below the city, which was acquired last year.

The Experiment Station had an exhibit, as usual, at the State Fair, that attracted considerable favorable attention. It has been our custom to try to feature some particular phase of the Experiment Station work each year at the Fair, and this year, we had in operation, an illustrated soil laboratory, showing the methods of soil analyses, methods of determining soil acidity, lime requirements, etc. Agreat deal of interest was manifested in this type of exhibit.

FERTILIZER AND FEED STUFFS LABORATORY.

During the past season the laboratory analyzed 2,837 samples of feed stuffs and 2,392 samples of fertilizer for the State Board of Agriculture and Immigration.

The following changes were made in the Station Feed and Fertilizer Staff during the year 1918-1919:

G. D. Cain, Chief Chemist in charge of the laboratory, was appointed Assistant Director of the North Louisiana Experiment Station at Calhoun, La., July 1, 1918. Mr. W. M. Hall succeeded Mr. Cain as Chief Chemist but resigned his position in October. Mr. A. P. Kerr, formerly Assistant Director of the State Station was appointed to succeed Mr. Hall. Mr. Sam Byall, who resigned to enter the Third Officers' Training Camp, returned after the armistice was signed and was reappointed as chemist on the laboratory staff, January 1, 1919. Mr. Joe Hart Jolly was appointed February 1, 1919, and resigned November 15, 1919, to accept a position in Cuba. Mr. E. C. Thomas, appointed January 1, 1919, resigned September 1, 1919, on account of ill health; Mr. W. E. Phillips, appointed September 15, 1919, resigned December 31, 1919, to accept a position in the laboratory of Armour & Company at Chicago. Mr. C. R. Hummel was appointed March 1, 1919.

SOILS LABORATORY.

S. S. Walker, Soil Chemist.

A total of 738 samples has been handled, distributed as follows:

"Official" soil samples, including those taken in connection with the Soil Survey, Lime Plots, etc.	541
Miscellaneous soil samples, sent in by residents of the State	102
Water samples	16
Lime, ashes, etc.	25
Ore samples	35
Miscellaneous samples	19
Total	738

One of the first tasks undertaken was to change the methods of soil analysis from the obsolete "strong acid soluble" method formerly in use, to methods for determining total constituents. This was accomplished in the face of great difficulties since the laboratory was not equipped for such methods, and the high price of platinum during the war made it impossible to purchase the apparatus usually considered necessary.

Also it should be mentioned that "total" methods of analysis, even under the best of working conditions, involve a great deal more time and labor than does the old-fashioned "acid soluble" method.

Magnesium has been added to the list of soil constituents formerly determined in the Soil Survey work.

Much time and work have been devoted to making a permanent detailed record of all the work done, since it is the writer's belief that work not worth recording is not worth doing at all.

Another time-consuming feature consists of the miscellaneous samples other than soils; about thirteen per cent of the total number of samples come under this head, but they consume a great deal more than thirteen per cent of the total time, since such samples require individual treatment and do not fit in with the regular routine soil work.

The above points are not mentioned in a spirit of complaint, but merely to explain any discrepancy between the number of soil samples analyzed by me, and the number previously analyzed in a similar length of time.

Much progress has been made in the elimination of meaningless miscellaneous soil samples sent in by residents of the state, by requiring each sender to take his samples according to printed directions, furnished by the laboratory, and to accompany each sample by a questionnaire (also furnished by the laboratory) giving detailed information about the soil in question.

In accordance with instructions, the miscellaneous soil analyses which have been made at the Louisiana Stations during the past twenty-six years have been collected and tabulated in form for publication, along with other miscellaneous analyses. Publication is delayed because these other analyses have not yet been tabulated by the Fertilizer and Feed Stuffs Laboratory.

In connection with the change in methods of analysis referred to at the beginning of this report, many minor investigations have been carried out to determine the suitability or accuracy of various methods with the equipment available, and to test newly published and unofficial methods preliminary to adopting them. One paper on the substitution of nickel crucibles for platinum ones, in making soil fusions, has been published in the *Journal of Industrial and Engineering Chemistry,* for December, 1919 Several other minor papers on laboratory procedures have recently been submitted for publication in chemical journals.

The writer has always worked in closest cooperation with the late Dr. F. V. Emerson, both in connection with the State Soil Survey and with the lime plot experiments on Field 17, of the Station Farm. Much time and thought have been given in helping to plan both of these projects. On the death of Dr. Emerson considerable time was spent in straightening out his records and in preparing for publication, papers which he had not quite finished, viz, ''The Bluff Soils of Louisiana'' and ''Road Materials in Louisiana.''

A paper on the ''Composition of Some Louisiana Soils as Related to Soil Series and to Texture'' has been prepared and submitted for publication as a bulletin of the Station.

An investigation on the ''Effect of Aeration and Other Factors on the Lime Requirement of a Muck Soil'' has been carried out during the past eight months and the results written up for publication in *Soil Science.*

In February, 1919, a week was spent attending the meetings of the Association of Southern Agricultural Workers, and of the Committee on Coordination, of the Agronomy section of that Association, in Birmingham.

During the week of July 14, 1919, the writer accompanied the Director and others, on a trip of inspection to the various reclamation projects in southern Louisiana. Many samples of the reclaimed soil were collected and subsequently analyzed in the laboratory.

Considerable preparation was made for a soil exhibit at the State Fair in 1918, but the fair was not held. In October, 1919, the writer prepared and personally supervised at the State Fair, an exhibit of apparatus, illustrating the steps used in a soil analysis. It is felt that this exhibit did much good in educating the people as to the labor and expense involved in chemical analysis.

STATION NO. 2, STATE STATION, BATON ROUGE.

A. F. Kidder, Agronomist and Assistant Director, in Charge.

Very little change has been made in the projects of the State Station since the last report was made, except in administration. New experiments on lime stone have been started and new phosphate experiments have been planned. Some of the old fertilizer projects are being changed to some extent, the cropping system taking effect for the 1920 crop season.

FERTILIZER AND ROTATION EXPERIMENTS.

The yields obtained from fertilizing corn for more than twenty successive years with nothing but commercial materials, were becoming so small that it was deemed advisable to begin to add some organic matter in order to determine the length of time required to put the plot back to normal tilth. Velvet beans were planted with the corn in 1918 and continued this past year, 1919. The same will be continued in 1920. There was a decided difference in the looks of the corn this past year, and the yield has been slightly increased through the use of legumes for one year. Both corn and beans were harvested. The adjoining plot, devoted also to corn, but with organic matter added to the commercial fertilizers, has been continued as before, with large yields resulting.

Continuous cotton growing with commercial fertilizer alone. is no more profitable than with corn; the plot this season only yielding fifty pounds of seed cotton.

The two year rotation plots have been continued as before. The lespedeza plot yielded one and one-quarter tons of hay this season but the cotton did not do nearly as well in proportion. All plots are now in oats. The corn in the plots this year was very poor , one of the plots producing only ninety pounds of very inferior corn. The lespedeza crop in the four year rotation was too poor to harvest, due to loss of a stand, and to poor drainage. Some adjoining plots were in the same condition.

MISCELLANEOUS TESTS.

The testing of *wilt resistant cotton varieties* was begun this past season. The stand of the various varieties were not very uniform and nothing can be guaged from the one year's results. This work will be repeated. Corn variety work was discontinued for the year but will be started again in 1920. *Varieties of oats* from the various southern stations have been planted. A nursery for oat improvement has been started and individual plant selection will be made for continuing this work. The Rosen rye is being compared with the Abruzzi, it being started this past season and no results are available.

Velvet beans were planted in corn, three different ways: (1) In the row with the corn; (2) every other row and (3) one row of beans and two rows of corn. The yields from one planting shows the first method to be the best. Velvet beans were also planted in the row with the hills of corn four feet apart each way. One half of the corn in this plot was tied similarly to tying for fodder cuting. No difference could be determined from the yield of corn and beans. Corn stalks break down quite easily when heavily loaded with velvet bean vines, so castor beans were planted to hold up velvet beans. More beans were obtained than when planted in corn but not enough to overcome the yield of both corn and beans. Further, there is extra expense attached to chopping and hauling the castor bean stalks away. Sunflowers will probably be tried for this purpose next year, as well as continuing the castor beans.

SILAGE CROPS AND OATS.

The silage crops after oats was continued with a few minor changes. The corn after oats, was practically worthless because of rust and a heavy rain the first week of August. Fair yields were obtained from sorghum alone and sorghum and soy beans. The Japanese cane was not harvested for silage but is being harvested as a soiling crop for the mules and horses on the farm. The cattle do not seem to care for it as a soiling crop. No steers are being fed this winter.

KUDZU FEEDING EXPERIMENTS.

The utilization of Kudzu is a somewhat difficult problem, for it cannot be harvested for hay without undue expense. This summer an acre was fenced and three Hereford cows were grazed on it. The Kudzu had a very rank growth and the largest vines were too tough for the cows to eat. However, the acre maintained the cows for thirty days. A small amount of corn was fed to each cow daily to counteract the effect of the Kudzu on the bowels. No difficulty was experienced in getting the cows to eat this plant. Probably the best way to pasture the plant would be to start in early spring when the first growth begins, and graze enough to prevent development of any large woody vines, the young shoots being very tender and well liked by the cattle.

In cooperation with the Dairy farm, Kudzu was fed in comparison with green soy beans and green corn. The three were fed as a soiling crop, but were passed through a cutting machine. Kudzu compared very favorably with the other two feeds.

HOG GRAZING CROPS.

The stand of these crops was not good and definite results could not be obtained in comparing feeds, so the experiment was made strictly a commercial one. The following results were obtained: One two acre plot of corn and peas (estimated yield, 28 bushels of corn and 5.5 bushels of peas per acre) produced 620 pounds of pork. Two and seventy-five hundredths acres of sweet potatoes and four and twenty-five hundredths acres of corn and soy beans (estimated yield of corn 9½ bushels per acre; of soy beans, 5 bushels per acre; of sweet potatoes, 55 bushels per acre) made 1,423 pounds of pork. Two acres of sweet potatoes and three and one-fourth acres of soy beans, together with twelve bushels of corn (estimated yield of sweet potatoes, 140 bushels per acre and of soy beans, 8 bushels per acre) gave 1,617 pounds of pork. The 13¼ acres of sweet potatoes, corn, and soy beans, and corn and peas produced 3,660 pounds of pork. As a commercial proposition this experiment was a success. The value of the 35 hogs used, was $663.38 at the beginning and sold for $1,094.60 at the end of 83 days, making $431.22 for the feed consumed as there was practically no labor in looking after the hogs; and the manure will more than pay for that.

HORTICULTURAL DEPARTMENT.

G. L. TIEBOUT, *Horticulturist.*

IRISH POTATO SEED IMPROVEMENT EXPERIMENT.

In cooperation with the U. S. Department of Agriculture, experiments were begun with the comparison of "certified" or "improved" Irish potato seed stock with commercial seed stock, procured through local dealers. Fifteen lots of "certified" or "improved" Triumph seed stock were shipped from Wisconsin, Minnesota, Nebraska, Michigan and Maine, and planted under parallel conditions with five lots of commercial Triumph seed stock (as checks) procured from Louisiana dealers at New Orleans, Alexandria and Baton Rouge. Owing to the very unfavorable season, Mr. Stuart, the potato specialist of the U. S. Department of Agriculture, did not think it advisable to draw any conclusions. The plots, however, were so arranged that all the work was not totally ruined by the very wet season and some valuable observations and records were made that will help with the future experiments, which will be continued for several years.

PROPOSED FRUIT AND TRUCK EXPERIMENT STATION.

A movement is under way to establish a branch station to serve the fruit and truck interests of the State. It is planned to have this station located in an established fruit and truck section and it will, no doubt, be organized under plans similar to those that brought about the Sugar and Rice Stations. There is a great need for horticultural investigations in this State, and it is hoped that this Station will soon be established so that these important activities will receive their share of attention.

In the commercial experiments with bell peppers, a new variety, the Royal King, is being tried and it is likely that this variety will supplant the Ruby King for shipping purposes. The color as well as the thickness of flesh of this variety approximates that of the Pimento. These two characteristics will likely give it an advantage over the Ruby King when offered in the ripened stage to the picklers and canners.

The preliminary work with rhubarb has continued. The nursery has been enlarged and trees of some of the leading varieties of fruit have been planted to provide scions. The Horticulturist attended the annual convention of the Vegetable Growers of America and visited potato sections in Wiscosin where some of the certified seed stock for the experiments at the Station is grown.

The usual exhibits for the Stations were installed at the State Fair; and the usual assistance in the production of crops was given the Department of Pathology, as well as the branch office of the Bureau of Entomology, of the U. S. Department of Agriculture.

DEPARTMENT OF ENTOMOLOGY.

W. E. Anderson, Acting Entomologist.

The work with which the Department of Entomology is charged is divided into four branches, as follows:

(1). The eradication of any injurious insect pest or plant disease which may be present in the State, if the damage done by any such insect pest or plant disease would warrant its eradication.

(2). Inspection of nursery stock, issuing certificates to those nurserymen whose nursery stock, upon inspection, was found to be free of injurious insect pests and plant disease; also the examining of out of state nurserymen's certificates, affidavits, etc., and if found to be satisfactory, issuing to them permits to ship nursery stock into Louisiana.

(3). Identification of insects, giving out information of an entomological nature as to control measures for different insects.

(4). Promulgating and enforcing quarantines and Rules and Regulations of the Department regarding the interstate and intrastate movement of nursery stock for agricultural purposes on account of a particular insect pest or plant disease.

Under the first duty with which the Department is charged, there is being conducted a campaign for the eradication of Citrus Canker, a disease which threatened to destroy all citrus plantings in the State. Towards this end, up to October 31, with the aid of an average of five inspectors, there has been inspected 131,504 Citrus Grove Stock, 102,896 Grove Trees and Nursery Stock destroyed on account of being infected with canker. These trees were located in seventeen parishes between the Mississippi River and Sabine River, and necessitated what you might call a house to house canvass in order to be absolutely sure that every orange tree was inspected. This was the first complete inspection that has been made of this territory and the results were very gratifying, because there was very little canker found west of the Parishes of Lafourche and Terrebonne.

The inspection of Nursery stock throughout the State necessitated the inspection of 76 different nurseries, with a total of 780,000 plants. Of the 76 nurseries inspected, 40 were granted certificates to do business. Of the remaining 36, 15 of them were found to be in such a condition that it was deemed unadvisable to allow nursery stock shipped from them broadcast over the country. The certificates of inspection and affidavits of 75 out-of-state nurseries were examined and permits to ship into Louisiana granted.

The entomological work that has been done consists of giving out information through the press and personal correspondence as to control measures for different insects and the identification of a great number. A representative from this office has made several trips to different points in the State to investigate outbreaks of insects and advise control measures for same.

Other entomological work for which this office is responsible is propaganda for an ant campaign in the orange section, the fruits of which are about to be realized; also to impress on the public the necessity of spraying the orchard and garden, and dusting of cotton for the control of boll weevil.

At the recent conference held in Houston, Texas, on account of the new infestation of the pink boll worm being found in old infested territory in Texas, the Louisiana representative reports that there is nothing alarming in the situation as the infestation is very light, and the authorities of Texas and the Federal Horticultural Board have it well in hand. The primary cause for these new infestations was the drouth in 1918, and allowing cotton to be planted in 1919.

During the year, with the approval of the Commissioner of Agriculture, a quarantine was placed on the importation of sugar cane into Louisiana, and the shipment of sugar cane grown east of the Atchafalaya River to points west of the Atchafalaya River prohibited on account of the sugar cane Mosaic disease.

VETERINARY DEPARTMENT.

W. H. Dalrymple.

The purely research work of the Veterinary department has been in the hands of Dr. Harry Morris, Bacteriologist and Assistant Veterinarian of the Station, a report of the work of which appears in another part of this general report.

The Chief Veterinarian's time has been divided between teaching in the College of Agriculture, and correspondence of a veterinary and animal husbandry character, connected with the Station. He has also occupied the position of Vice-Director of the Stations, and filled the place of Director during the absences of that official.

DEPARTMENT OF ANIMAL PATHOLOGY.

Harry Morris.

The work in the Department of Animal Pathology has been continued along the same lines as in previous years and includes a study of some of the more important animal diseases.

A study of some of the non-biting flies as transmitters of anthrax has been completed and published in Bulletin No. 168. The results of this work should prove the necessity for prompt and complete destruction of all anthrax carcasses. They should also help to educate the people against the dangerous and useless practice of opening anthrax swellings on animals sick with the disease. The results should prove the necessity of giving animals greater protection against the ravages of all insects during outbreaks of anthrax.

A number of other live stock diseases have been studied during the past year. Mixed infection in swine is very common in the State and is often confused with hog cholera. Some work has been done on this subject.

The infectious abortion project has received some attention during the past year. The department had the opportunity of studying an outbreak of the disease in a local dairy herd. By enforcing the laws of sanitation for a relative short period of time, the disease seems to be under control, the "storm" seems to have passed as normal calves are being born in great numbers.

A great many specimens have been received at the laboratory for examination. The subject of intestinal parasites in cattle, sheep, and hogs seems to be of great importance to the live stock interests of the State, as many specimens have been received for examination.

DEPARTMENT OF PLANT PATHOLOGY.

C. W. Edgerton.

During the year 1919 the Department of Plant Pathology has continued the investigations on several of the important plant diseases of the State. The projects receiving the most attention include the following:

SUGAR CANE DISEASES.

The investigations on the effect of fungi on the germination of the "eyes" or buds were continued. This work has now been in progress for about ten years. The results obtained during this whole period have been written up and will be published as a bulletin during the early part of 1920.

The recognition of the Mosaic disease of sugar cane in Louisiana necessitated a study of this disease. The department assisted in the survey of the State to locate the present points of infection and also started some experiments on the life history and control of the disease. Observations on the various varieties of cane seemed to show that the L-511 cane is the most resistant of the important canes grown in the State. As all the canes at Audubon Park are affected with this disease, it seemed desirable to make a new start with the L-511 cane at some other point in the State. Consequently, a shipment of this cane was obtained from Franklin, La., and was planted on the Experiment Station grounds at Baton Rouge. Articles on this disease were published in the Louisiana Planter, and also as an Extension Circular, in order to acquaint the sugar planters with the seriousness of the trouble.

TOMATO WILT.

The study of the tomato wilt has included a study of the life history of the causative organism, its relation to such environmental factors as temperature, the testing of the resistance of various tomato varieties and the selection of wilt resistant strains of tomatoes. The results which have been obtained on this disease are being compiled and it is hoped that they can be published during the early part of 1920.

COTTON WILT.

The experiments on cotton wilt were more or less a failure during 1919. A variety test using all of the important varieties of cotton resistant to the wilt, which are now being grown in the Southern States was started, but the very wet season injured the crop to such an extent that no results of any value were obtained.

Several experiments were also started in various parts of the State, in cooperation with the Extension Pathologist. These experiments could not be looked after, however, as the Extension Pathologist resigned and no one was appointed to take his place.

Other projects which received some attention during the year include the eggplant blight, alfalfa diseases and the Sclerotim wilt disease.

STATION NO. 1—SUGAR EXPERIMENT STATION,

Audubon Park, New Orleans, La.

W. G. Taggart, Assistant Director, in Charge.

SUGAR CANE WORK.

The past year has been one full of the most difficult obstacles to overcome in conducting field operations that we have ever experienced. Lack of sufficient financial support, together with high cost of everything, particularly ordinary labor, left a heavy mark upon our records. We had more wet days than dry ones during the entire planting and harvesting period, and because of this and insufficient funds with which to secure outside labor for rushing the work when conditions were favorable, we had to abandon some of our plats, not even planting a few of them.

Seedling Canes: Under an arrangement with the U. S. Department of Agriculture, which has already been reported, the Department has agreed to germinate cane seedlings for us, but on account of the late start made last winter, they were not successful in securing a germination of any seed which they had gotten for the work. The best of the seedlings which we had grown on the Station grounds were continued under test, and some of them are proving of merit. In the early spring we discovered that the Mosaic disease of sugar cane had appeared in many places in the State and the Station cane was infected. This disease makes doubly important sugar cane seedling work. If it is not found possible to eradicate this new disease it may be necessary to undertake to develop varieties of sugar cane that are either immune or highly resistant to the disease. We have already started on a new project, which is planned along this line. All of the varieties of cane grown here have been inspected and such of them as show any tendency towards resisting the disease have been selected and planted in somewhat larger plats than has been usually used. These varieties will be watched very carefully with reference to Mosaic disease. It is worthy of note that the variety L-511 seems to be hurt less than the older varieties now grown in the State. L-511 continues to hold up to the record it has set for itself. This year we made as much cane per acre from L-511 as from the average of any of the older canes, and the juice from it showed a sugar content of 14.25 against an average of about 11.50 for the juice of D-74 and Purple. A paper covering seedling canes was prepared for the Sugar Planters' meeting. It was read before the meeting and later published in the official journal.

On account of Mosaic disease, this year we did not distribute any canes far planting purposes. However, we were fortunate enough to secure seed free from disease for a new start in L-511 and L-253. This cane has been planted in territory free from the new disease and in a few years we will have a sufficient quantity of it to begin sending out seed of these valuable canes again to the sugar growers of the State.

Fertilizer Work: In spite of the heavy handicap under which we operated, some good results were secured from field tests of fertilizers. Most striking among these results is the yield from cane grown after Melilotus had been used as a winter and early spring cover crop. After a very good growth of this clover had been turned in on the spring and fall plant cane and the land had received a dressing of 250 pounds of acid phosphate, a yield of 18.45 tons per acre was secured from D-74 cane; on a check which received the acid phosphate and all other treatment in the same proportion, but no cover crop, only 11.94 tons were secured. Sweet clover was bought delivered in New Orleans, for five cents per pound in time for the 1919 fall planting. This would indicate that the sweet clover for such use would cost a planter about fifty cents per acre.

Again we can report a good increased yield from canes treated with 500 pounds of acid phosphate, as compared with 250 pounds, when each carried an equal quantity of nitrogen (36 pounds actual nitrogen). The average results of nine years show that this fertilizer, while giving good results on plant cane, gives better results on stubble, when both plant and stubble are given the same amount of plant food. The returns on stubble from the crop just harvested, show that the cane with 500 pounds acid phosphate and a ration and half of nitrogen gave 16.2 tons; cane with half the quantity of phosphate and an equal amount of nitrogen yielded 12.55 tons, and a check plat 6.32 tons. Nitrogen, in this case, was secured by using high grade tankage.

The usual tests of nitrogenous material with one additional material was conducted. This work shows that Cyanamid is worthy of attention. Yields of cane treated with it in comparison with nitrate of soda, sulphate of ammonia, tankage, cottonseed meal, and ammonium nitrate, gave tonnages in the order named, as follows: 18.52; 18.62; 17.63; 19.62; 17.19; 17.18. A plat using acid phosphate only as a check on the other plats yielded 12.33 tons. The figure shown from the plat using cottonseed meal is somewhat lower by comparison than we could expect in a wet year from that material. It is possible that the nitrogenous matter contained in the meal used was not up to the standard availability of the average meal. We know that this meal was unusual, it being a dark brownish black meal, which is said to be made by a new process of oil extraction. Some attention should be shown to this so-called new grade of cottonseed meal.

The ammonium nitrate used in the above experiment was furnished by the U. S. Department of Agriculture, and was intended to test the possible use, agriculturally, of products from plants either built or planned for the manufacture of war munitions.

The Entomological Work of the Station was handled as usual in cooperation with the U. S. Bureau of Entomology. A comprehensive bulletin (U. S. Department of Agriculture Bulletin No. 746) was issued during the year on the Sugar Cane Moth Borer, and a Farmer's bulletin on the Argentine Ant is soon to appear.

At present the main investigations concern the control of the sugar cane moth borer, usually called the "borer" or the "cane borer," and the sugar cane mealy bug. Specimens of the latter have been sent in recently by planters who were under the impression that they had found a new fungus growth on the cane, and it is evident that interest in this insect is increasing. Experiments have proved that it is responsible for a larger amount of injury than was suspected, and other experiments have demonstrated that it may be controlled by decreasing the number of ants in the fields, the ants so affecting the mealy bugs to their benefit, as to cause them to multiply to a very great extent. The ants may be controlled in the fields by the use of the poison syrup which has been perfected at this Station. Some doubt has been expressed as to whether this method is practicable under plantation conditions. but a large test is soon to be started on a typical plantation.

The control of the sugar cane moth borer has been found to depend on the parasites of this insect. The native parasites can be utilized by avoiding the burning of the leaves or trash left on the fields after the cane is cut. Satisfactory methods of plowing this trash under have been originated and are gradually being adopted on the plantations. As the native parasite attacks only the eggs, however, and is slow in appearing in the spring, it has been found desirable to introduce a parasite which will attack the larva itself. Such parasite has been found in Cuba. This is a tachanid fly, resembling to a casual inspection, the common house fly. The maggot of this fly destroys the larva, or borer, in the cane plants, and in Cuba acts very efficiently. Three attempts have been made to introduce this parasite and this year much has been accomplished. Over 900 parasites were collected in Cuba and sent to New Orleans, where they were cared for and transferred to breeding cages and released in the cane fields. Three plantations were selected in different parts of the sugar section, and on these, and at the Experiment Station, the parasites were released. Examinations were made at all places later and without an exception, the parasites were found to have attacked the borer, and bred exactly as they do in Cuba. There is some doubt as to whether they hibernated successfully. Even with the best results, however, the parasites will hardly be present on more than one hundred acres, all told, in 1920, while they are needed on something like 300,000 acres of cane land alone, in Louisiana.

NORTH LOUISIANA EXPERIMENT STATION

CALHOUN

Sidney Stewart, Superintendent.

The work at this Station for the past year was practically the same as has been carried on for the past several years, with addition of the demonstration work in cotton, corn and peas, and corn and velvet beans, on three separate areas in the "Lee" fields, situated in the southeastern part of the Station property.

A "Model Farm Orchard" was put out on a plot of two acres, northeast of the Superintendent's residence. This is a demonstration and an experiment in line with the efforts of the Experiment Station and Extension department in getting an orchard on as many farms as possible.

A flock of purebred S. C. Rhode Island Red poultry was bought in March from the Owens Farms, Vineyard Haven, Mass. Two poultry yards and a house to accommodate one hundred hens were built according to plans furnished by the Extension department. A "Buckeye" incubator and a brooder were also bought. The results thus far, have been unsatisfactory. A number of the birds died from various causes, and the remaining ones are comparatively inactive and slothful.

The demonstration work in the Lee field is on the ground which has been used for silage and necessitated growing the silage crops in the "Old Peach Orchard" field. The soil is too poor to produce profitable crops and has consequently been fallowed for the past three years. Owing to the late start in all the work of the Station, and the silage being left until most of the other crops were in, only about thirty tons of a poor grade of silage were produced. The excessive rainfall in the spring and summer retarded the work through the planting and cultivating seasons.

Calcium arsenate was used on the cotton fields, with very satisfactory results in controlling the boll weevil.

In the experiments and general crops grown on the Station during the year, 367 bushels of corn (besides what was grazed by the hogs and fed from the field), 13,681 pounds of cotton, 188 bushels of sweet potatoes, and about 14 tons of hay, were produced and harvested. A fairly good crop of velvet beans and cowpeas was grown.

Most of the buildings have been put in good repair, some of them having been taken down and rebuilt, using galvanized iron for the new roofs. An addition to the Superintendent's residence has been built and a fifty-six battery Delco electric light plant installed. All of the buildings on the grounds are furnished with lights.

The regular monthly agricultural meetings were held during the year. The second fair, since being discontinued in 1917, was held three days during October. A creditable display of agricultural products and livestock was made.

THREE YEAR ROTATION EXPERIMENT.

In this experiment, one-third of the area is planted to cotton, one-third to corn and peas, and one-third to oats, followed by peas. During the period between 1889 and 1908, the east half of each plot received an application of compost, at the rate of 30 bushels per acre. This compost is made up of green cotton seed, stable manure, and acid phosphate. Since 1908 the applications of compost have been made to the south half of each plot; therefore, one-fourth of each plot has received compost annually since 1889; one-fourth has received compost since 1908; one-fourth had received compost until 1908; and one-fourth has had no compost.

The results for 1922 on these plots are as follows:

	SE¼	SW¼	NE¼	NW¼
	¼ of plot fertilized with compost annually since 1889.	¼ of plot fertilized with compost annually since 1908.	¼ of plot composted until 1908.	¼ of plot with no compost since 1889.
Plot A Cotton.	1689.8 lbs. seed cotton per acre.	975.4 lbs. seed cotton per acre.	1174.2 lbs. seed cotton per acre.	684 lbs. seed cotton per acre.
Plot B Corn	22.33 bushels per acre.	20.37 bushels per acre.	15.11 bushels per acre.	12.48 bushels per acre.
Plot C Oats	2.23 tons hay per acre.	1.48 tons per acre	1.98 tons.	1.21 tons hay per acre.
Peas	2.10 tons hay per acre.	1.60 tons per acre	2.01 tons.	1.04 tons hay per acre.

tering the mill juice hot with the aid of Filter-Cel (Kieselguhr) which removed all suspended matter and yielded a clear, but still dark juice. This was then treated with Norit, and the juice resulting from this operation was quite or almost water white. At the present writing the results of our experiments have not been calculated, but it is safe to say that from the standpoint of clarification, this process appears promising. A publication on these tests will be issued shortly.

PROJECT NO. 2.

Influence of Red Rot on the Composition of Sugar Cane.

It was impossible to do any work on this project during the past year, for lack of time.

PROJECT NO. 3.

Determination of Sucrose in the Presence of Reducing Sugars.

Dr. Schneller, who finished the work on this project in 1917, has sent us an outline of his results, and has promised a manuscript on the subject for publication.

The following publications have been contributed by this department: Louisiana Bulletin No. 165, The Color of Sugar Cane Products, and Decolorization in Factory Practice, by F. W. Zerban and E. C. Freeland;

Progress report of chemical research department of the Louisiana Sugar Experiment Station for 1918, submitted to the Louisiana Sugar Planters' Association, by F. W. Zerban, Louisiana Planter *62*, 219-23;

Louisiana Bulletin No. 167, Studies on the Preparation of Vegetable Decolorizing Carbons for the Sugar Industry, by F. W. Zerban, E. C. Freeland and D. D. Sullivant;

The Color Changes of Sugar Cane Juice and the Nature of Cane Tannin, by F. W. Zerban. Journal of Ind. Eng. Chem. *II*, 1034-6.

DEPARTMENT OF BACTERIOLOGY.

NICHOLAS KOPELOFF.

The role played by molds in deteriorating sugar has been investigated in detail and it was found that mold spores contain enzyme invertase. The influence of concentration and amount of inoculum upon the deteriorative activity of mold spores was studied in highly concentrated sugar solutions as well as in laboratory-made sugars with films of varying concentration. These data formed the basis for the prediction of the keeping quality of sugars, and are discussed in a bulletin in press. The fate of microorganisms was again traced through the various stages of the manufacture of sugar. Bags of sugar stored under normal conditions were analyzed periodically, both chemically and bacteriologically, in an investigation of the practical aspects of the project.

RICE EXPERIMENT STATION,

CROWLEY, LA.

J. M. Jenkins, Superintendent in Charge.

In general, investigations pursued for the past several seasons were continued this year, embracing a study of rice varieties, methods of cultivation, and irrigation. Many new projects were outlined to commence this season but all, save experiments with fertilizers, for securing fundamental data, were prevented by exceptionally bad weather during the winter and spring.

A pathologist was appointed by the Cereal Office, to devote his entire time to the study of rice diseases. Modern laboratory equipment is being installed for use in these investigations.

Several farmers report excellent results with new rice varieties introduced by this Station, and had ready sale for their entire output, for seed purposes, one producing sufficient seed for one thousand acres and another for about two thousand acres.

Inquiries for information relative to rice culture have greatly increased. Scarcely a day passes that applications are not received, not only from all over the United States, but from foreign countries as well.

Encouraging results were obtained from the Biloxi soy bean, used in rotation on experimental area devoted to variety work, and gives promise of becoming a valuable crop in this section for rotation with rice, where some such crop is greatly needed to aid in the eradication and control of weeds, as well as in the improvement of the soil. The demand for this seed is greater than we are able to supply.

NORTH LOUISIANA EXPERIMENT STATION,

CALHOUN, LA.

G. D. Cain, Assistant Director, in Charge.

The work was continued along lines similar to those of previous years as far as possible. The Irish potato experiment was the only new work undertaken. *The Cook Cotton Thinning Ex-*

periment and the *Cotton Fertilizer Experiment* were so badly damaged that no results could be reported. All of the work has been handicapped for the year by the epidemic of influenza and weather and labor conditions. Labor conditions may be much better for 1920 than for 1919 unless something unforseen comes up.

THREE YEAR ROTATION EXPERIMENT.

Inthis experiment, one-third of the area is planted to cotton, one-third to corn and peas, and one-third to oats, followed by cow peas. During the period between 1889 and 1908 the east half of each plot received an application of compost at the rate of 30 bushels, per acre. This compost is made up of green cotton seed, stable manure, and acid phosphate. Since 1908 the applications of compost have been made to the south half of each plot. Therefore, one-fourth of each plot has received compost annually since 1889, one-fourth has received compost since 1908, one-fourth received compost until 1908 and one-fourth has never received any compost.

The north half of each of the three plots received an application of 16% acid phosphate, at the rate of 150 pounds per acre.

The results for 1919 on these plots are as follows:

	of plot fertilized with compost annually since 1889.	¼ of plot fertilized with compost annually since 1908.	¼ of plot fertilized with compost annually until 1908.	¼ of plot that has never received compost.
Plot A.	Lbs. seed cotton per acre			
Cotton................	861.11	605.55	700.00	383.33
Plot B.				
Corn, Calhoun Red Cob Bu. per acre..	23.81	18.65	18.81	11.51
Plot C.				
Oats, Bu. per acre......	21.70	12.15	15.19	10.16
Peas*.................				

*On account of weather and labor conditions, it was not possible to harvest the peas in a way that a record can be made for the different portions of the plot. 842 pounds in the hulls were picked.

RAW ROCK PHOSPHATE VS. ACID PHOSPHATE.

THREE YEAR ROTATION.

In this experiment one-third of the area is devoted to cotton, one-third to corn and a legume, and one-third to crimson clover followed by velvet beans. The velvet beans are plowed under in the fall with raw rock phosphate applied to one-half of the plot, at the rate of 2700 pounds per acre. Each plot receives an application of raw rock phosphate every three years, while acid phosphate is applied to the cotton and corn crops at the rate of three hundred pounds per acre each year. The results for 1919 are as follows:

CORN		COTTON	
Raw rock phosphate 2700 lbs. per acre every third year.	Acid phosphate 16% at the rate of 300 lbs. per acre.	Raw rock phosphate 2700 lbs. per acre every third year.	Acid phosphate 16% at the rate of 300 lbs. per acre.
20.20 bu. per acre	20.00 bu. per acre.	547 lbs. seed cotton per acre.	576 lbs. seed cotton per acre.

CORN VARIETY TEST.

1919.

Variety	Bushels per acre	Percent of grain	Seed Secured From.
Calhoun Red Cob	21.9	88.22	N. La. Experiment Station.
Robert's White Dent.	22.8	85.96	N. G. Roberts, Fayetteville, Ark.
Calhoun Red Cob	21.9	86.05	J. W. Supple, Bayou Goula, La.
Sentell's W. Dent	20.8	81.48	J. N. Sentell, Dixie, La.
Hastings Prolific	21.4	86.11	H. G. Hastings, Atlanta, Ga.
Stewart's Y. Dent	21.9	84.61	Nat. Stewart, Plain Dealing, La.
SurCropper	28.2	80.36	Ferguson Seed Farm, Sherman, Tex.
Ozark Famous (Failed to germinate after two plantings)			A. L. Steffins, Siloam Springs, Ark.
Ferguson's Y. Dent	25.5	83.64	Ferguson Seed Farm, Sherman, Tex.
Alexander's Improved Dwarf Mex. June	28.2	83.33	Monroe Seed Co., Monroe, La.
Chisholm	23.7	80.39	Ferguson Seed Farm, Sherman, Tex.

CORN FERTILIZER EXPERIMENTS.

The various fertilizer tests with corn were so variable and contradictory that their publication is withheld for the present.

COTTON VARIETY TEST FOR 1919.

Variety	Per Acre Yield	Per Pound No. Bolls	Lint Percent	Staples
Rublee	378	66	31.50	Short
Trice	441	72	27.50	Short
Cook's Improved	336	66	36.25	Short
Hawkins' Extra Prolific	378	75	32.50	Short
Hawkins' Big Boll	336	59	31.25	Short
Simpkins Ideal	357	82	32.50	Short
Simpkins Big Boll	357	60	32.50	Short

Variety	Yield Per Acre	No. Bolls Per Pound	Percent Lint	Staples
Wilt Resistant A	336	76	31.50	Short
Wilt Resistant Hybrid, No. 143	336	74	30.00	Short
O'Bannon's No-Chop	315	66	32.50	Short
Boykin's No. 2	294	52	37.50	Short
Mebane Triumph A	357	48	35.00	Short
Triumph 1012	378	55	37.50	Short
Triumph 406	357	46	40.00	Short
Triumph 600	378	48	36.25	Short
Triumph G	357	48	37.50	Short
Forester 995	315	58	27.50	Short
Lone Star	336	49	33.75	Short
Ferguson's Round Nose	357	56	31.25	Short
Wannamaker's Improved Cleveland Big Boll	399	64	35.00	Short
Cleveland Big Boll	399	52	31.75	Short
Hastings' Upright	336	67	31.25	Short
Rowden	315	51	31.50	Short
Moneymaker	315	76	35.00	Short
Bank Account	273	80	36.25	Short
Columbia	294	59	30.00	Long
Acala	294	59	30.00	Long
Kekchi	231	63	31.25	Long
Durango	357	66	31.50	Long

The per cent lint was determined by Dr. Robert Glenk of the Louisiana State Museum, New Orleans, La.

COTTON VARIETIES FOR 1919.

Variety.	Seed Secured From
Rublee	N. Louisiana Experiment Station
Trice	J. F. Bridger, Bells, Tenn.
Cook's Improved	J. R. Cook, Ellaville, Ga.
Hawkins' Extra Prolific	B. W. Hawkins, Nona, Ga.
Hawkins' Big Boll	B. W. Hawkins, Nona, Ga.
Simpkins' Ideal	Wake County Seed Co., Raleigh, N. C.
Simpkins' Big Boll	Wake County Seed Co., Raleigh, N. C.
Wilt Resistant, Selection A	Dr. C. W. Edgerton Baton Rouge, La.
Wilt Resistant, Hybrid No. 143	Dr. C. W. Edgerton Baton Rouge, La.
O'Bannon's No-Chop	Ernest O'Bannon, Homer, La.
Boykin No. 2	Ferguson Seed Farm, Sherman, Texas.
Mebane Triumph A	Ferguson Seed Farm, Sherman, Texas.
Triumph 1012	Ferguson Seed Farm, Sherman, Texas.
Triumph 406	Ferguson Seed Farm, Sherman, Texas.
Triumph 600	Ferguson Seed Farm, Sherman, Texas.
Triumph G	Ferguson Seed Farm, Sherman, Texas.
Forester 995	Ferguson Seed Farm, Sherman, Texas.
Lone Star	Ferguson Seed Farm, Sherman, Texas.
Ferguson's Round Nose	Ferguson Seed Farm, Sherman, Texas.
Wannamaker's Improved Cleveland Big Boll	Klondyke Seed Farm, Colliston, La.
Cleveland Big Boll	J. R. Cleveland, Stratton, Miss.
Hastings Upright	R. G. Hastings Co., Atlanta, Ga.
Rowden	Rowden Bros., Wills Point, Texas.
Moneymaker	Chris Reuter, New Orleans, La.
Bank Account	Chris Reuter, New Orleans, La.
Columbia	Bureau of Plant Industry, Washington, D. C.
Acala	Bureau of Plant Industry, Washington, D. C.
Kekchi	Bureau of Plant Industry, Washington, D. C.
Durango	Bureau of Plant Industry, Washington, D. C.

COW PEA VARIETY TEST FOR 1919.

Variety	Bushels Per Acre
Whippoorwill	7.74
Large Blackeye	5.12
Groit	9.07
Early Red	4.97
Cream Crowder	4.66
Rice or Lady	4.09
Clay	5.84
Brabham	4.09
Taylor	4.66
Monetta	5.84
New Revenue	11.37
Black	4.66
Red Ripper	11.50
Iron	5.84
Filipino	5.84

VELVET BEANS AND SOY BEANS.

These beans were all lost on account of the continued wet weather at the time that they were maturing, so no data can be given on the different varieties.

FORAGE CROP TESTS FOR 1919.

Variety	No. Cuttings	Yield Tons Per Acre	
Texas Seeded Ribbon	1	15.47	(Green)
Early Amber	1	10.96	(Green)
Orange	1	10.96	(Green)
Red Top or Shumac	1	13.20	(Green)
Japanese Honey	1	16.73	(Green)
Giant Beggar Weed	1	4.10	(Green)
Golden Millett	1	.60	(Dry)
Sudan Grass	1	2.23	(Dry)
White Black Hull Kafir Corn	1	10.12	(Green)
Dwarf Milo Maize	1	6.72	(Green)
Feterita	1	7.14	(Green)
Rhodes Grass (Failed to Germinate).			

These varieties were planted June 24, and were fertilized with stable manure at the rate of 4 tons per acre and 16% acid phosphate at the rate of 200 pounds per acre.

RESULTS SECURED FROM NORTHERN GROWN TRIUMPH SEED STOCK IN 1919.

Lot.	Source of Seed	Bushels Per Acre			Percent Gain over check
		Primes	Culls	Total	
1.	Nebraska Potato Co., Chadron, Neb.,		Not furnished for this Station.		
2.	A. Meeker, Alliance, Neb	34	25	59	13.5
3.	August Cadeken, Bushnell, Neb	40	28	68	30.8
4.	E. Kirkpatrick, Morrill, Neb	49	36	85	63.5
5.	Peter Jansen, Morrill, Neb	42	38	80	53.8
6.	J. Pedrett, Kimball, Neb	44	27	71	36.5
7.	L. Procheska, Foley, Minn	24	31	55	5.8
8.	H. Tollefson, Clear Brook, Minn.,		Not furnished for this Station.		

Lot.	Source of Seed	Bushels Per Acre			Percent Gain over check
		Primes	Culls	Total	
9.	Peter Narum, Bemidji, Minn.	26	19	45	13.4
10.	Eric Michelson, Pembine, Minn.	48	33	81	55.8
11.	J. W. Smith, Kent, Wis.	33	28	61	17.3
12.	A. T. Johnson, Angus, Wis.	41	25	66	26.9
13.	W. A. Andrews, Walhalla, N. D.	32	27	59	13.5
16.	C. R. Miller, Manastique, Mich.	36	41	77	48.1
Checks.					
6.	Local seed purchased Alexandria	35	32	67	
1.	Local seed purchased New Orleans	26	24	50	
11.	Local seed purchased New Orleans	29	31	60	
20.	Local seed purchased New Orleans	18	21	39	
16.	Local seed purchased Baton Rouge	22	22	44	

Copied from the report returned to us by Prof. Wm. Stuart of Washington, D. C.

These potatoes were planted March 13, on gray sandy loam soil and fertilized with 2 parts cotton seed meal and 1 part acid phosphate at the rate of 600 pounds per acre. Dug June 10th.

HOG GRAZING EXPERIMENT.

July 22, 52 head hogs, shoats and pigs turned on 1½ acres Groit cow peas, drilled in 30" rows. Weight	4700	pounds
July 28, Hogs weighed	5050	pounds
	350	pounds gain
Gain per acre	233.32	pounds
Aug. 12, 50 head hogs, shoats and pigs turned on 4.45 acres of corn. Weighed	5030	pounds
Sept. 4, Weight	5730	pounds
	700	pounds gain
Gains per acre	157.3	pounds

Estimated yield of corn, 25 bushels per acre.

SILAGE.

About 50 tons of silage was put up this year. The corn was damaged by drouth and did not make a very large stalk; however, the ears were very well developed. The soy beans were well fruited.

We are now feeding 57 head of cows, yearlings and calves. All of the cattle are in very good condition.

ORCHARD AND VINEYARD.

The peach and apple crops were almost complete failures this year. Many of the seedling peach trees have died. It will be necessary to replace many of the Elberta trees, as none have been set out for several years.

The grape and scuppernong crops were very good. No records were kept on the yields, as they ripened at our busiest time and they could not be harvested systematically. All trees and vines were sprayed and pruned.

PECAN TREES.

The four Moneymaker trees west of the residence averaged 500 nuts this year. The trees in the pecan orchard averaged about 50 nuts.

THE NORTH LOUISIANA AGRICULTURAL SOCIETY.

Five meetings have been held this year with a fairly good attendance at each meeting. Several dealers in improved farm machinery have expressed a desire to demonstrate at the meetings next year. I believe these demonstrations combined with talks on agricultural subjects will tend to increase the interest in the meetings.

EXPERIMENT STATION DAIRY.

R. C. Calloway, in Charge.

It has been rather a strenuous year for the Dairy on account of high prices for feed and labor, and the latter has been difficult to obtain at any price at the most urgent time. Although we have encountered many difficulties, the Dairy has a fair report to submit.

During the year two fertilizer experiments were conducted, the first being ammonium nitrate vs. calcium cyanamid, for silage crops; the second, a comparison of kudzu, soy beans, and green corn as soiling crops for summer feeding.

The results obtained from the first experiment showed very little difference in either the ammonium nitrate or the calcium cyanamid, both giving a large increase over the plats where no fertilizer was used. The kudzu, soy beans, and green corn experiment was a short time test, extending through a period of forty days. The results obtained in the test were in favor of the soy beans first, green corn second, and kudzu third.

The Empire milking machine was installed during the month of May. This machine has given good satisfaction. With this machine, one operator is able to milk on the average, about twenty cows per hour. The cost of operating, including one man's time, fuel, oil, repairs, depreciation, interest, washing, and disinfectants, is about ninety cents per day, or four and one-half cents per cow, while it costs about eight or nine cents per cow per day to get the milking done by hand.

An outbreak of contagious abortion occurred in the herd in 1918. By the use of sanitation, within one year's time the disease seemed under good control. About twenty-two cows aborted, which is about seventy-five per cent of the milking herd and the heifers old enough to be bred. Six of the twenty-two aborted the second time, while the other sixteen seemed to be safely in calf. In trying to combat the disease, the killed organism was used on all pregnant animals, but of no avail. Living organisms were used on all virgin heifers old enough to breed and these were bred sixty days following. Some of these have calved normally and all of the others seemed to be safely in calf and show no signs of abortion.

A new addition was made to the dairy barn, comprising eight large roomy box stalls and a ten foot feed alley, and by making use of the alley ten cows can be well taken care of. The purpose of this addition was to furnish comfortable quarters for cows on register of merit record work.

Ten cows were on official test during the year, and six of these completed their records, as follows:

Lady of Beachwood (Jersey) No. 388982, 6195.2 lbs. of milk and 300 lbs. fat at the age of 2 years and 9 months.

Creampot's Bessie, (Jersey) No. 362854, 10,283.6 lbs. milk and 445.79 lbs. fat at the age of 3 years and 9 months.

Creampot's Pearl (Jersey) No. 363480, 6514.5 lbs. milk and 305.41 lbs. fat, at the age of 3 years and 1 month.

Louisiana's Fair Queen (Jersey) No. 362857, 6713.8 lbs. milk and 338.63 lbs. fat at the age of 2 years, and 10 months.

Bell Bettina Skylark (Holstein) No. 159057, 12,724.8 lbs. milk and 413.85 lbs. fat at the age of 8 years and 1 month.

Bell Birmingham De Kol 4th (Holstein) No. 291585, 7398.4 lbs. milk and 272 lbs. fat at the age of 3 years.

Four years ago the Dairy did not own any Register of Merit cows. The above Jerseys were bred and raised on the Dairy Farm and these and four others are from the same sire. Two of these cows are are on test and producing as high as 43.5 lbs. of fat per month. They will qualify for the Register of Merit with a large amount to their credit.

We have made a wonderful improvement in the herd and the increase in value has been steady. The value of the dairy herd at this time is about $14,000. We own several show cows and heifers, and one or two young bulls, among which we expect to have some strong individuals to exhibit at the National Jersey Show, to be held at Shreveport, La., next October.

Exhibits of both Jerseys and Holsteins were made at the State Fair at Shreveport this year, and both herds were strong competitors for the highest honors offered. Lady Grace De Kol Johanna, 2nd, No. 303881 (Holstein) won the reserve grand champion. She was first in butter fat production, making 5 lbs. of fat from 157.3 lbs. milk in four days, after being on the road three days and kept under most adverse conditions while on test. She was second in economy of production of butter fat, making 1 lb. of fat for every 12 lbs. of grain consumed.

Excellent results were obtained by spraying the dairy herd with a solution of Nicotine Sulphate for horn flies. The cost of spraying each animal was about one cent per day, per cow, the time it took to spray the animals was about a minute per cow each day. We found that it was not necessary to spray each day in order to keep the flies under control. About every other day was sufficient. By using the sprayer regularly and removing all manure from barnyard to field daily, keeping all drains open and all wet places drained and well limed horn flies can be controlled in most any dairy herd.

Good crops were grown on the farm this year, the early corn and soy beans for silage averaged nine tons per acre and sorghum after oats averaged about six tons per acre. A good crop of vetch and oats was raised for hay which averaged about three tons. This made an excellent quality of hay. After the clover and vetch were harvested a good crop of June corn was raised.

EXPERIMENT STATION DAIRY.

Statement of Receipts and Expenditures of the Experiment Station Dairy Fund from June 30, 1918 to July 1, 1919.

Receipts.	
Milk	$4,807.63
Livestock	1,671.09
Miscellaneous	42.40
Total Receipts	$6,521.12
Balance June 30, 1918	834.83
Total Receipts and Balance	$7,355.95
Expenditures.	
Labor	$2,706.48
Sundries	1,405.87
Fertilizer	12.00
Feed Stuffs	1,098.72
Tools, Implements and Machinery	224.72
Live Stock	567.75
Building and Repairs	1,328.07
Total Expenditures	$7,343.61
Balance June 30, 1919	12.34
Total balance and receipts	$7,355.95

THIRTY-SECOND ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

Agricultural and Mechanical College

FOR 1920

TO THE GOVERNOR

BY

W. H. DALRYMPLE

DIRECTOR

January 31, 1921.

To His Excellency, John M. Parker,
Governor of Louisiana.

Sir—I have the honor to submit herewith, the annual report of the Agricultural Experiment Stations of the Louisiana State University and Agricultural and Mechanical College, for the year 1920. As required by act of Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional federal funds for research work at the experiment stations of the several states, a financial statement is appended, for the year beginning July 1, 1919 and ending June 30, 1920.

Respectfully,

W. H. Dalrymple,
Director.

Louisiana State University and Agricultural and Mechanical College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO

GOVERNOR JOHN M. PARKER, President.
I. D. WALL, Vice-President, Board of Supervisors.
HARRY D. WILSON, Commissioner of Agriculture and Immigration.
THOS. D. BOYD, President, Louisiana State University,
W. H. DALRYMPLE, Director of Agricultural Experiment Stations.

EXPERIMENT STATION STAFF

W. H. DALRYMPLE, M. R. C. V. S., Director.
W. C. TAGGART, B. S., Asst. Director, Sugar Sta., New Orleans.
A. F. KIDDER, B. S., Assistant Director and Agronomist, Baton Rouge.
G. D. CAIN, B. S., Asst. Director, North La. Experiment Station, Calhoun.
J. MITCHELL JENKINS, B. S., Asst. Director, Rice Station, Crowley.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Asst. Plant Pathologist, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Veterinarian, Baton Rouge.
G. DIKMANS, D. V. M., Parasitologist and Asst. Veterinarian, Baton Rouge.
T. H. JONES, B. S., Entomologist, Baton Rouge.
W. G. BRADLEY, Assistant Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
A. P. KERR, M. S., Chief Chemist, Baton Rouge.
W. P. DENSON, B. S., Assistant Chemist, Baton Rouge.
J. H. JOLLY, B. S., Assistant Chemist, Baton Rouge.
A. D. LIPSCOMB, B. S., Assistant Chemist, Baton Rouge.
E. C. THOMAS, M. S., Assistant Chemist, Baton Rouge.
C. R. HUMMEL, B. S., Assistant to Chief Chemist, Baton Rouge.
R. P. SWIRE, B. A., Treasurer, Baton Rouge.
W. G. RAINES, Assistant Research Chemist, New Orleans.
R. C. CALLOWAY, B. S., Manager of Dairy, Baton Rouge.
A. A. ORMSBY, Specialist in Fair Exhibits, Baton Rouge.
MRS. RUTH HEIDELBERG, Secretary, Baton Rouge.
Mrs. HELEN HARDY, Mailing Secretary, Baton Rouge.
J. K. McHUGH, Stenographer, New Orleans.
E. K. BREEDEN, Farm Manager, State Station, Baton Rouge.
SIDNEY STEWART, Farm Manager, North La. Station, Calhoun.

ADMINISTRATIVE.

On December 31, 1919, the Experiment Stations had the misfortune to lose the valuable service of Prof. W. R. Dodson, who had been Director of the Stations since 1905. The severance of Professor Dodson's relations with the organization was a distinct loss to the work, and to the agricultural interests of the State generally, as, besides his knowledge and ability concerning matters agricultural, he was always ready and anxious to assist in pushing forward any project which had for its object the betterment of our agricultural people, whether social or material.

The administration of the work of the Stations has been under the direction of the present incumbent of the office, who is also Dean of the College of Agriculture of the University, since January 1, 1920, when he was appointed to succeed the former Director.

Owing to conditions subsequent to the late World War, the expenses of the organization have been very much increased during the past year, in salaries, in labor, and in the cost of necessary materials. However, the General Assembly, at its last regular session, in order to meet increased expenditures, including repairs to Station property, etc., was generous enough to raise the State appropriation for the several stations, $25,500 per annum, for the biennial period.

PROPOSED TRUCK AND FRUIT STATION.

A delegation from Tangipahoa Parish, headed by Mr. H. P. Mitchell, President of the Police Jury, appeared before the Committee on Agriculture of the House of Representatives, at the last meeting of the Legislature, and stated that they had passed an ordinance setting aside one-eighth of a mill out of the revenues of the Parish, for ten years, to provide a site and buildings for a Truck and Fruit Station in that Parish.

At the solicitation of this delegation, and upon the recommendation of the Station authorities and the State Commissioner of Agriculture, a bill, authorizing the establishment of such a station in the Florida Parishes, was passed by the Legislature.

Soon after the passage of this bill, a representative of the Stations appeared before the Police Jury of Tangipahoa Parish, requesting that the necessary steps be taken to purchase the property, which was to have been selected by a committee representing the State.

In December, an ordinance was passed to make the sum of $20,000 available through the issuance of certificates of indebtedness. Subsequently, however, with a change in personnel of the Police Jury, both of the ordinances referred to were repealed, much to the disappointment of many of the prominent people of the section.

But while this unfortunate action of the Police Jury of Tangipahoa Parish will, necessarily, delay the locating of a station in that particular section, work in truck and fruit investigations will be extended and advanced at the State Station for the time-being, at least, so that this important branch may not be permitted to suffer.

IBERIA LIVE-STOCK EXPERIMENT FARM

The present Director has, at the request of United States Secretary of Agriculture Meredith, succeeded the former Director, as a member of a committee to supervise the operations on the Iberia Live-Stock Experiment Farm at Jeanerette, La., in which the State is cooperating with the Federal Government. Reports have, from time to time, been received at this office from the Specialist in charge of the Farm, showing some excellent work accomplished, the results of which should be extremely useful to us from an experimental point of view, and which have been published, in epitomized form in a Report of the Operations of the Bureau of Animal Industry, for the fiscal year ending June 30, 1920, under the heading, "Activities Receiving Special Attention."

SUGAR EXPERIMENT STATION

We have been notified by the Audubon Park Commission, New Orleans, that our Sugar Experiment Station must be moved from its present site by March, 1922.

In order to retain the Station on suitable land in the vicinity of New Orleans, the Louisiana Sugar Planters' Association has purchased, and proposes to deed to the Board of Supervisors, of the Louisiana State University and Agricultural and Mechanical College, a tract of land, about thirty acres, close to Harahan, on which to locate the Station.

Preliminary work will be commenced on the new property as early as possible, so as to get the land in order for planting operations; and other matters, looking toward removal, will be attended to, so far as present Stations funds will permit. It is hoped, however, that sufficient funds will be forthcoming to place this Station on a permanent basis, and with equipment commensurate with the great agricultural industry it represents in Louisiana.

Since the death of Dr. F. V. Emerson, the Station has not been able to secure the services of a suitable person to take charge of the Geological Department; and the position of Soil Chemist has been vacant since the resignation of Mr. S. S. Walker. It is hoped, however, that both of these important positions may be filled in the near future.

Cooperating with the University, the Extension Department, and the State Department of Agriculture, the Stations employed an expert on exhibits, whose report appears in another part of this report. The result of this officer's work has been very evident in the much better display of our exhibits at the State and other fairs, including a special exhibit of our agricultural products at the Grain and Hay Show, in connection with the International Live Stock Exposition, at Chicago, in 1920. The consensus of opinion seems to have been that the Louisiana exhibit attracted more attention and created more favorable comment than any other similar display at the show.

STATION NO. 1

Sugar Experiment Station, Audubon Park, New Orleans.
W. G. Taggart, Asst. Director, in Charge.

SUGAR CANE WORK.

The year 1920 was in many respects similar to that of 1919. The difficulties, if anything, were more numerous and more obstinate. Labor was slightly more plentiful, but could be obtained only at such heavy cost as to make it almost prohibitive to this

Station. In fact, the funds at the Station's disposal were barely sufficient to support two aged negroes during the spring and summer months. As a result of this condition, in order to give all the time to the more important plats of cane, it was necessary to abandon some of the experimental work that had been started.

Tremendous inroads were made on the Station Staff. In fact, the entire laboratory staff from both chemical and bacteriological departments resigned to accept more lucrative positions elsewhere. The executive department has made diligent search for men to replace those who left, and even sent a representative to the East and Middle West for the purpose, but to date, no one considered competent has been found, who would become interested in the salary offered. Temporary arrangements were made to carry on the work of these departments. Two able persons, one a chemist and the other a bacteriologist, were assigned to duty by the courtesy of the Bureau of Chemistry of the United States Department of Agriculture, and this arrangement has enabled us to continue, during the grinding season, the most important studies that were under consideration. These temporary aids will shortly be recalled to Washington and we are still without a chemical staff.

The yields of sugar cane per acre were poor, and were to a large extent, a reflection of the labor troubles already mentioned. However, comparatively the results were good, and some very valuable data were secured. Fertilizer experiments conducted with nitrogenous materials showed the usual progress, and somewhat better contrasts between fertilized and unfertilized canes were obtained. The increased yields due to the standard ration of 36 pounds nitrogen, varied from 49.6 to 91.7 per cent when first year stubble was under consideration, and from 21.1 to 48.5 per cent in the case of plant cane. Ammonium nitrate again caused the greatest increase in tonnage, and it was followed by cottonseed meal and calcium cyanamid. Tankage followed its precedent of the past six or eight years by yielding the lesser return. This last mentioned fact is, of course, to be expected, when we consider that the livestock industry has made such heavy demands for blood and beef scraps. While at an earlier date slaughterhouse refuse carried with it much scraps and dried blood that found its way to the fertilizer factory, today, only such of that material goes to fertilizer as cannot be used otherwise. The usual good results were obtained from our experiments with phosphoric acid. That mixture carrying 72 pounds of available phosphoric acid with its ration of nitrogen gave an increase of 131.5 per cent, while one with 36 pounds of phosphoric acid and an equivalent ration of nitrogen gave only 26.6 per cent increase.

The work with clover used as a winter and early spring crop, with a slight deviation, was continued. On account of some suggestions from sugar planters, to the effect that the cost of hoeing was severe, where clover had been grown on fall planted cane, the Station tried to devise a means of obviating the objection. A sharp stubble shaver was used to remove the growing clover from the ridge over the planted cane. While this implement can be used satisfactorily, so far as the removal of the clover is concerned, it should never be done late. Cane so treated was so severely set back by the shaving that it never fully recovered. The beneficial effect of the clover on the physical condition of the soil was apparent throughout the season, and a slightly increased yield of sugar cane was obtained from the plat which had been planted to sweet clover, but not nearly so great an increase as has been obtained during the last few years.

Crimson clover is not so well suited to this use as sweet clover. It is encouraging to note that this work has been adopted by the sugar planters. One planter bought a carload of sweet clover seed for the use of himself and neighbors.

No new varieties of sugar cane were obtained during the year, and all variety work was done with those already on hand. L-511 continued its good record here. The juice from that cane contained 14.75 per cent sucrose as compared with 12 per cent for D-74 and 11.75 per cent for Purple. L-511 also shows marked resistance to the Mosaic disease of sugar cane. By selection, progress was made toward obtaining at least a Mosaic-resistant strain of that cane. Selection of resistant cane of other varieties was begun at the time of the last planting. All seedlings that show resistance are being especially watched, and the possibility of good results is at least hopeful.

Work with seed cane dipped in bichloride of mercury solution was continued. An increased yield was obtained from Louisiana Purple cane treated in this way, but contrary to the results of 1919, lesser yields were secured from L-511. This is an example of the annual variables met with in experimental work, and illustrates the necessity of continued diligence to produce reliable data.

On account of the lack of labor and the unfavorable weather those experiments which were continued on corn, clover, alfalfa and other such crops, had to be abandoned.

RESEARCH CHEMICAL DEPARTMENT.

The chemical department, under the able direction of Dr. F. W. Zerban, finished a masterly piece of work which has been published as Louisiana Bulletin No. 173. This work embodies a close study of the coloring matters of sugar cane and sugar-cane products, together with the effect of chemical as well as mechanical clarification on them and on other solids not sugar contained in sugar cane juice. The demand for Bulletin No. 173 is very heavy and reflects the appreciation of the sugar public for the work. Further investigation along this same line, but using four activated carbons in the sugar house, instead of one, is being continued by Dr. J. F. Brewster.

DEPARTMENT OF BACTERIOLOGY.

The bacteriological department under Dr. Nicholas Kopeloff completed some valuable work on the effects of molds and mold spores on sugars in storage, and the results have been published as Bulletins Nos. 170 and 175. This work points out the possibility of molds and mold spores through the secreted enzyme destroying sugar in the process of manufacture and in storage. Also methods of preventing such loss are established. Especially interesting is the effect of superheated steam when applied to sugars in a centrifugal. This use of steam is easily applicable to any sugar house, and the information as to means of applying it and the results caused thereby have been the subject of many letters addressed to this Station during the past few months. Further data on the factor of safety to be used in determining the keeping qualities of sugar to be stored is also given. A systematic continuation of this work this season has been conducted by Dr. Margaret B. Church, of the United States Bureau of Chemistry, temporarily assigned for the purpose, and her findings will be published later.

The Entomological Department, in charge of men connected with the United States Bureau of Entomology, has done very good work, substantially aided by a sum of $10,000 contributed by a group of sugar planters for the purpose.

A large number of parasites were brought into the State by Messrs. Holloway and Barber. These were put out on plantations, and in many cases, it has been found that they thrive. In the canes at the Sugar Station, over three hundred were obtained from the field in November and are being carried over the winter for further work. The large number of parasites found here point to success with that beneficial insect, for while some of them most probably came from parasites released this year, there are too many to be accounted for in that way only. Many of them must have come from parasites that survived the winter of 1919. Again the mealybug infestation was found to be comparatively very low, due to a control of the Argentine ant by arsenical poison.

The annual Field Day of the Louisiana Sugar Planters' Association was held on the Station grounds. The attendance was large and the exhibits and field demonstrations unusually interesting and instructive.

STATION NO. 2

State Stations, Baton Rouge, A. F. Kidder, Assistant Director and Agronomist in Charge.

The work at this Station has been along the same general lines as the previous year, although several new projects have been started. All plats of each series were given the same treatment as in previous years, and good weather prevailed in nearly all cases, during the harvesting period.

The variety test work was transferred to new plats in order to carry the work on in a rotation. A brief statement is given of each project.

FERTILIZERS.

Project No. 1: A comparison of a mixture of cottonseed meal and acid phosphate when used with and without organic matter and applied at different times during growth. Corn is grown each year on these plats. The yields in 1920 show a marked variation in favor of the organic matter and only a small difference in time of applying the fertilizer.

Project No. 2: The effect of cowpeas, soybeans, and velvet beans (plowed under) on cotton and oats when planted in a two-year rotation of cotton, oats and legumes. Velvet beans plowed under gave a better yield of both cotton and oats than the other two legumes plowed under.

Project No. 3: The effect of soybeans sown in the corn at last cultivation on the yield of cotton and corn in a rotation of cotton and corn. The soybeans gave an increased yield of approximately one hundred per cent in both corn and cotton. It certainly pays to plant legumes in corn even in a short rotation.

Project No. 4: The effect of permanent cropping; corn and cowpeas; corn and velvet beans; corn and soybeans; lespedeza; and cotton. The cotton crop was approximately one-fifteenth of a bale per acre. All others gave fair yields.

Project No. 5: The effect of different applications of lime stone. These plats were sown in Crimson clover during the winter of 1919-1920 and in Biloxi soybeans in 1920. There was no variation noticeable in the yield of the different plats.

CROPS.

Project No. 1: Cotton; selection and breeding. Seed of two varieties was distributed over the State and fair reports were obtained. The long staple selection was continued. In this work, a sufficient amount of seed from staple one and one-half inches in length was obtained to plant a large enough area to get over six hundred individual plants to continue the work in 1921. The long staple bale in 1919 was mixed some with short staple for this character is not fixed. However, the bale was sold in Vicksburg, Mississippi for sixty cents a pound.

Project No. 2: Corn; selection and breeding. Selection of individual kernels from a hybrid corn together with hand pollination has given very good results in getting a yellow corn with a bright red cob. Work is being continued in attempting to get a white cob in the White Calhoun corn.

Project No. 3: Oats; selection and breeding. Preliminary work with an oat nursery work was started in 1919 and continued this year, with some quite noticeable variations. A number of plants were selected to continue this work because of higher yields, stronger straw and less rust. This project at the present time seems to be very promising of bringing good results.

Project No. 4: Variety tests of cotton, corn and oats. The varieties of cotton are classed as wilt resistant. There was not much variation in the test this year. Corn varieties from Louisiana and some promising varieties from the other Southern States were planted at the rate of 6,000. 7,000 and 8,000 stalks per acre. There was a very noticeable variation in the yield of varieties. In practically all cases the 6,000 stalks per acre produced more corn than the larger number of stalks per acre. There was a marked variation in the yield and growth of the oat varieties.

Project No. 5: Effect of strength of germination on yield of corn. There was a considerable variation in this work. The ears having a strong germination gave a much better stand of corn, practically one hundred per cent in all strong ears.

Project No. 6: Alfalfa; selection and breeding. A project to attempt to get a strain of alfalfa for bluff soils. Some progress made in 1920.

CROPS AND LIVE STOCK.

Project ***No.*** **1: Hogging off crops** (corn and soybeans, corn and cowpeas, soybeans and sweet potatoes). Excellent results were obtained with the first two combinations and the soybeans alone. Shrimp bran was fed in self-feeder when the hogs were grazing on the sweet potatoes, with results that are far from gratifying. From this one test we cannot recommend feeding shrimp bran with sweet potatoes.

Project No. 2: Grazing different grasses and Kudzu with cattle. Ten steers grazed for 126 days on a pasture receiving different treatment as to mowing and plowing, and on Kudzu. Some very interesting results were obtained, especially with Kudzu and mowing the pasture. It will pay one to mow pastures once and possibly twice during the summer grazing period.

STATION NO. 3

North Louisiana Station, Calhoun.
G. D. Cain, Asst. Director, in Charge.

The work at this Station has been carried on as previously outlined, with the exception of projects on comparison of acid phosphate and raw rock phosphate; fertilizer experiments on cotton and corn; and varieties of sweet potatoes and sorghums, which were discontinued at the beginning of the year. Only one new project was added this year, a three-year rotation, comparing the effects of stable manure in different amounts and different methods of applying, on cowpeas, cotton and corn.

The rotation where a home-made compost was used for thirty years, shows clearly that the physical condition of the soil is very much better than where it has been used only twelve years; also that the compost must be applied every year to obtain the best results.

As this was the first year's results of crops from the three-year rotation with stable manure, it is impossible to draw conclusions that would be at all reliable.

In the corn variety test, it is shown that a prolific type produces a good yield for the sandy hills section of North Louisiana. The old and proven variety, Calhoun Red Cob is as good a variety of corn as can be grown in North Louisiana.

In variety test with cowpeas, we have found a few very promising varieties for this section, but about the best all-around cowpea for our use is the New Era.

The Mammoth Yellow variety is about the best soybean for our use. There are a few other varieties such as Barchett, and Virginia that are becoming very popular, especially for hay.

The Osceola velvet bean is one of our best yielding varieties, this year's results being two tons per acre of beans in the pod.

On account of ideal conditions for boll weevil infestation this year, our cotton variety test was not as accurate as it otherwise would have been.

PORK PRODUCTION.

Hogs grazed on corn and soybeans produced 15.4 lbs. of pork per bushel of corn. This shows again that the most profitable way for a farmer to market his surplus corn is by allowing the hogs to harvest the crop and sell the hogs.

ORCHARD AND VINEYARD.

Very little attention has been paid, in an experimental way, to the orchard and vineyard this year. It has been kept principally as a demonstration that grapes, plums, peaches and other fruits can and should be raised by the farmers in this section.

WEATHER CONDITIONS.

The lowest temperature recorded was 17°F. in November; the highest was 104°F. in July. The total rainfall was 70.96 inches, fairly well distributed throughout the year.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

A great deal more interest was taken in the meetings held at the Station by the North Louisiana Agricultural Society this year than in 1919. The members of the Society voted to revive the annual fairs that were held at the Experiment Station up to 1916.

STATION NO. 4

Rice Experiment Station, Crowley.
J. M. Jenkins, Assistant Director, in Charge.

The same lines of investigation were pursued as reported for the year 1919, and a few new projects started. Weather conditions were exceedingly trying during the seeding and growing season. Heavy rains during the winter months left the soil in a wet, compact condition; this followed by high winds at seeding time, made it impossible, in many cases, to obtain a good seedbed. Frequent rains during the summer interferred with cultivation, but were very beneficial in the matter of supplying irrigation water. The total precipitation for the year was 68.01 inches. This was nearly three inches more than the highest recorded for any one of the past ten years, at this Station. While the precipitation was heavy, we were fortunate in having good harvest weather.

The results for the year were very satisfactory in practically all lines of investigation. Much information was obtained of a conclusive nature, and of such character as to enable more intelligent research in the future.

The Pathologist, assigned to work with rice diseases, by the Office of Cereal Investigation, of the United States Department of Agriculture, was able to confirm work already done by others, relative to "straighthead" and succeeded in working out very satisfactory control methods, that will be used in the future for more extensive experiments along this line. His work has also given very accurate indications as to the cause of this condition, commonly known as straighthead. A bulletin on this subject is now being prepared jointly by the Pathologist and the Assistant Director. In addition to his work with straighthead, Dr. Tisdale discovered two diseases, not heretofore reported as attacking rice.

Our results with fertilizers, including lime in different quantities, are such that we feel that very conclusive information along this line can be given before very many years.

The results of experiments along the lines of irrigation and other cultural methods, including preparation of soil, manner and rate of seeding, character of seedbed, etc., for the past ten years, are being prepared for publication in the near future.

The work of introducing new rices, giving evidence of greater merit than those now grown commercially, has progressed very nicely. Two varieties were on a rather large acreage this season and gave results very much in excess of commercial rices, according to reports from cooperators.

During the State Fair, we served in our booth, at a certain hour each day, cooked rices, composed of three commercial varieties and four that are being introduced by this Station, requesting those testing them to vote on the one preferred. This rice was served in a plain boiled state, for the purpose of determining whether or not differences in flavor would be detected by the general public. The results obtained indicate very clearly that the public detects differences, and has special likes and dislikes in the matter of rice as well as in other things.

During the last six days of the contest, three hundred and forty-six votes were cast for the eight rices; out of this number the two leading commercial rices received a total of seventy-two, and the two leading Station rices, a total of one hundred and ninety. The remaining votes were scattered rather evenly among the remaining four varieties. I might add that the variety occupying the leading place as to commercial acreage, received only thirty-three votes out of a total of four hundred and fifty-six, while the leading Station rice received eighty-eight; and another Station rice, not so extensively grown, received one hundred and forty-seven votes. This would indicate that the consumer is not getting the variety of rice that he would prefer.

DEPARTMENT OF PLANT PATHOLOGY

Baton Rouge.

Dr. C. W. Edgerton, Pathologist in Charge.
C. C. Moreland, Assistant.

The work in the Department of Plant Pathology during 1920 was, in general, a continuation of the work of previous years, consisting of investigations on a number of the important plant diseases of the State. The projects which have received the most attention include the following:

SUGAR CANE DISEASES.

The results on the effect of fungi on the germination of cane were published in bulletin form during the year. It was found that the fungus causing the red rot disease, *Colletotrichum falcatum,* was instrumental in reducing the germination of the "eyes" or buds of cane.

The Mosaic disease of cane spread very rapidly during 1920. There is now a very heavy infection all along the river, and the disease is present to a considerable extent along Bayou Lafourche. It is also appearing in isolated places in the western part of the sugar belt. Recent investigations bear out the observations made in previous years that the L-511 seedling is the most resistant to the disease of any of the important canes of the State. It has also been demonstrated that healthy cane of this variety can be selected by an examination of the stalks. This makes the seed selection work much easier.

Experiments have also shown the extreme susceptibility of the D-95 cane to the Mosaic disease. Data on the susceptibility of other varieties have also been obtained.

TOMATO WILT.

The results of several years work on the tomato wilt were published in bulletin form during the year. The work for the year consisted in testing out a number of wilt resistant varieties of tomatoes and continuing the selection work for wilt resistance. The Louisiana wilt resistant selections still continue to give very satisfactory results.

EGGPLANT BLIGHT.

The work on the eggplant blight was brought to a close during 1920. The results which have been obtained have been compiled and will be published in bulletin form during the early part of 1921.

CORN DISEASE PROJECT.

A new project on corn diseases was started during 1920. The project will include studies of the various organisms attacking root, stem and ear.

OTHER PROJECTS.

Other projects which received some attention during the year were the cotton wilt, alfalfa diseases and the Sclerotium disease.

DEPARTMENT OF ANIMAL PATHOLOGY

Baton Rouge.

Division of Bacteriology,

Dr. Harry Morris.

During the year 1920, the Bacteriological Division has continued the investigation of some of the important animal diseases of the State.

During the summer months anthrax developed in many of the Parishes, causing considerable loss in animals. On account of these outbreaks, many specimens were sent to the Station laboratory for examination. At least fifty per cent of these specimens were received in bad condition. The blood smears had not been properly prepared by the senders, and on arrival at the Laboratory, putrefactive organisms were present in great numbers. Some of these organisms resembled the anthrax germ so closely that it was difficult to make a correct diagnosis in a short period of time. Various methods of identification were studied during the year. In the majority of cases definite information could be furnished the livestock owner without delay, if the blood smears were prepared in the proper manner—directions for which have been published from time to time.

Although anthrax developed on several farms in East Baton Rouge Parish during the past year, there was not a case among the livestock on the Station farms, all the animals having been treated with anthrax vaccine during the months of March.

Some study has been given the infectious swine disease, commonly known as ''Mixed Infection.'' The data obtained, however, were so varied and confusing as to make it impossible to draw accurate conclusions. But from the observations made, these conditions should be eliminated in the majority of cases of so-called ''Mixed Infections''—hog cholera, parasites and insanitary surroundings.

Infectious abortion developed in the Station dairy during 1919, with about one hundred per cent loss in calves. However, with strict sanitary rules observed by the Superintendent in charge, the infection appears to have been eradicated, with the result that, during 1920, almost a normal crop of calves were raised, and the herd has since been in a very healthy condition.

DIVISION OF PARASITOLOGY.

Dr. G. Dikmans.

The work in animal parasitology was begun about October 1, 1920. The scope of the work so far has been confined to determining the types of parasites found in meat-producing animals, and the relative frequency of their occurrence as evidenced by the examination of carcasses of animals slaughtered at the Baton Rouge Municipal abattoir and such other instances as are brought to the attention of the Parasitologist. It is proposed to extend the scope of the work to cover as large a portion of the State as is practicable at some later date. No special problem in connection with this work is being undertaken at the present time, but this phase of the problem will receive due attention at the proper time.

Owing to unavoidable delays in obtaining the necessary equipment, progress has not been as rapid as might have been desired. However, it is confidently expected that this situation will be remedied in the near future.

Dr. Dikmans came to the Institution at the beginning of the College session 1920-21, as Assistant Professor of Veterinary Science, in the College of Agriculture, and Parasitologist of the Experiment Stations.

DEPARTMENT OF ENTOMOLOGY

Baton Rouge.

Thos. H. Jones, Entomologist in Charge.
W. G. Bradley, Assistant.

When the present Entomologist took charge of the work of this Department on July 1, 1920, it was decided to restrict largely the research work to the principal insects injurious to corn and livestock in the State. These include the Southern corn rootworm or budworm, the corn earworm, the rice weevil, or black weevil, a serious pest of stored corn, the horn fly, and the mosquitoes, horse flies, and warble flies that attack livestock.

The progress made on these projects has necessarily been limited, due largely to the fact that they were not taken up until the middle of the year. Something in the way of a foundation on which future work can be based, has, however, been laid down, for all the projects.

Some time has been spent in building up a collection of injurious insects, particularly those of Louisiana, with the idea of using this material both for display purposes and in connection with the making of identifications of insect material sent in by correspondents.

Numerous letters, asking for information concerning various insects, and coming largely from correspondents in Louisiana, have been received and answered and articles concerning some of the more important insect pests have been given to the press. An extension circular on the pink bollworm, prepared in collaboration with Mr. W. E. Anderson, Entomologist of the State Department of Agriculture, has also been published.

T. H. Cutrer, Thos. H. Jones and C. E. Smith, while members of the Bureau of Entomology, United States Department of Agriculture, have all been stationed at Baton Rouge at different times during 1920, for cooperative work with the Experiment Stations, on truck crop insects.

DEPARTMENT OF HORTICULTURE

Baton Rouge.

G. L. Tiebout, Horticulturist.

Irish Potato Seed Improvement: In cooperation with the United States Department of Agriculture, experiments were continued (second year) in the comparison of inspected Irish potato seed stock with commercial seed stock procured through Louisiana dealers. Thirteen lots of inspected Triumph seed stock were sent from Wisconsin, Nebraska, and Minnesota by the United States Department of Agriculture. These, with four lots as checks of commercial seed stock, procured from Louisiana dealers, were planted in six sets at different dates. Most of the sets did not meet with favorable weather conditions and results were not satisfactory. One set, however, was planted and grown at a time more favorable for potato production, and the representatives from Washington chose this one for the records. Results showed that the inspected stock from Nebraska and Wisconsin, on an average, showed an increase over the average of the commercial seed stocks. There were some very striking yields made by some strains of the inspected stock. The average of the Minnesota strains fell a little below the average of the commercial stock. In connection with this work, an inspection trip was made of fields where certified stock was being grown in Wisconsin.

Investigations and demonstrations in the growing and marketing of Royal King bell peppers, in the culture of rhubarb and sweet corn, and in shipping of Brussels sprouts to the New Orleans market, have been carried on.

Bell peppers of the Royal King variety were grown and shipped by express in commercial quantities to the northern markets. The earlier fruit was fine. In the fall, however, the Mosaic disease ruined the crop, and the usual marketing of red fruits in New Orleans for pickling purposes, was not carried out as trial shipments indicated that the quality was not satisfactory, due no doubt, to this disease.

Our experiments in the culture of rhubarb indicate that it can be satisfactorily grown under garden conditions by importing two-year roots from the North each year.

Demonstrations in the shipping of Brussels sprouts to New Orleans indicate a demand for limited quantities at high prices.

Investigations in the production of sweet corn for the home garden show that delicious ears for the table can be had continuously over a period of eight to twelve weeks by making succession plantings. Sweet corn is not commonly grown in Louisiana.

A large portion of the Horticulturist's time is occupied with miscellaneous activities. He cooperates in the growing and marketing of the crops for five scientific projects; he maintains growing vegetables, nursery, orchard and greenhouse for the use and observation of cooperators.

EXPERIMENT STATION DAIRY

Baton Rouge.

R. C. Calloway, Superintendent.

HERD MANAGEMENT AND REGISTER OF MERIT WORK.

The herd was managed in practically the same way as last year. At the close of the year the herd consisted of sixty-five head, all pure breds. Twelve head of cattle, eight females and four bulls, were sold during the year to farmers over the State.

The Register of Merit work was continued from last year and three more cows completed creditable records. Thirteen more have been placed on test and the monthly reports show the best records ever obtained during any other year by a Jersey. The highest record heretofore for a Jersey was 47.72 lbs. fat, made by Creampot Bessie No. 3362854, in 1919, while the highest obtained for a Jersey in 1920 was 67.3 lbs. fat in the month of December, by Lady of Beechwood No. 388982. This record is exceeded by only one other record and that was made by Bell Bettina Skylark No. 159059, a Holstein, in 1919, when she made 75.61 lbs.

The results obtained in combating contagious abortion seem to be in keeping with the prediction of last year, as only six abortions occurred in 1920 as against twenty-two in 1919. Twenty-three normal calves were dropped in 1920 as against fifteen in 1919. Very favorable comments by authorities on contagious abortion have been made on the splendid results obtained.

FEEDING EXPERIMENTS.

Two experiments in feeding were begun this year:

(1) To ascertain the physical effects of low-grade cane molasses, commonly called ''Blackstrap'' molasses on young calves; (2) Rough rice as a feed for dairy cows.

Neither of these experiments has been completed. However, the results obtained so far from the feeding of blackstrap molasses to calves are conclusive enough to show that it can be fed safely to young calves on their grain feed without any bad physical effects.

The grain fed with the molasses consisted of 100 lbs. wheat bran, 50 lbs. ground oats, 50 lbs. corn meal and 50 lbs. velvet bean meal. As a check some calves were fed the grain mixture without the molasses. It is expected to continue this experiment with some minor changes—for instance, the molasses will be fed to some calves in the milk.

The rough rice experiment was begun in November. The idea of this experiment is to determine its value as a dairy feed, and to note the physical effect of the rough rice on the animals.

A ration was composed of 350 lbs. of ground rough rice and 100 lbs. of 7% cottonseed meal and is being fed against a ration which consists of 350 lbs. corn meal, 100 lbs. 7% cottonseed meal, 100 lbs. wheat bran. The rice ration is evidently not as palatable as the corn meal ration, as it took several days to get all cows to eat it, and occasionally some cows will refuse to eat it after a preliminary period of twenty-one days. However, this experiment has not been in operation long enough to get the final results in this report. So far, no untoward effect from the hulls has been noticed.

FORAGE CROPS.

The forage crops grown on the Dairy farm this year consisted of velvet beans and corn, soybeans and corn, sorghum, alfalfa, soybeans, oats, vetch, lespedeza, native hay, turnips and rutabagas. Two fields of corn and soybeans were grown for silage, one early and the other after oats. The yields were fairly good in both fields, especially the late crops, as the soybeans were above the average. Sorghum was planted after the oats for silage. About two acres of soybeans were planted for hay after oats.

The oats and vetch did not make as heavy a yield as the year before, but the quality of the hay was much better.

The lespedeza and native hay was cut in September, and was saved in very fine condition, as the weather conditions were quite favorable for the harvesting of hay. The yield was good, averaging about two tons.

The turnips and rutabagas were planted the first week in September. They were not so good on account of the dry weather, but were large enough to begin feeding the latter part of October.

The rutabagas did better than usual, and were ready to feed in December.

In February one acre of ground was planted in alfalfa. The land was prepared by plowing into beds about sixteen feet wide, with deep water furrows between, thereby giving good drainage. About six tons of raw limestone, and a good application of stable manure were applied, the ground well harrowed and allowed to settle before planting. South Dakota No. 28 was the variety used. It is a very fine-stemmed variety, and makes hay of excellent quality but falls down under heavy rains. The acre yielded 4,270 lbs. of good cured hay, 830 lbs. damaged hay—this was the third cutting and was as good as the second cutting, which amounted to 1,700 lbs. and 1,000 lbs. of crabgrass with a few stems of alfalfa. The plat was cut five times, the last cutting being given the latter part of September. Between 6,000 and 7,000 pounds of hay were cut off the acre during the entire season. The alfalfa stood the season well until about August, when the weather began to get hot, and the ground dry and hard. At that time the grass began to do its best. The alfalfa died out in spots and on the sides of the beds. It is the purpose to reseed these spots again in February 1921.

CARE OF THE PERMANENT PASTURES.

A part of the permanent pasture north of the railroad was plowed, disced, terraced, and planted in oats, barley and white clover. The native grasses which followed these grew better, and fewer weeds came up on this part than on the part that was not plowed. The weeds were cut on all parts with the mower where possible, and by hand where the machine could not be used. Both pastures were drained during the year.

DEPARTMENT OF EXHIBITS

Baton Rouge.

A. A. Ormsby, Specialist.

In cooperation with the Louisiana State University, the Agricultural Extension Division, and the State Department of Agriculture, the Louisiana State Experiment Stations made exhibits and demonstrations in 1920 at the State Fair of Louisiana, at

Shreveport, from October 28 to November 7, and at the International Live Stock Show at Chicago, November 27 to December 4.

At the State Fair of Louisiana, under the general direction of Mr. G. L. Tiebout, Horticulturist, comprehensive educational displays and demonstrations were made in various lines of horticulture and pomology by means of charts, photographs, farm products etc.

Under the direction of Mr. J. Mitchell Jenkins, of Crowley, an exhibit of the work of the Rice Experiment Station was made by the use of rice sheaves, panicles, seed and the milled product. Cooking demonstrations were conducted by an experienced home demonstration agent, who prepared eight varieties of the milled product in food dishes and passed the same out to the visiting public.

The North Louisiana Station of Calhoun and the Audubon Park Sugar Station of New Orleans were represented by products dealing with their respective activities. The Experiment Station laboratories, directed by C. R. Hummel, had a very attractive display, consisting of charts, photographs, and chemical apparatus, showing how the laboratory work is conducted, and the results of scientific investigations in the use of feeds and fertilizers.

Following the close of the State Fair of Louisiana, a large portion of the exhibit material of the State Experiment Stations was packed and shipped to Chicago, where it was included in the Louisiana State exhibit at the International Live Stock Exposition. In addition to the display of agricultural products and illustrative material at Chicago, bulletins and circulars of the Louisiana State Experiment Stations were distributed to the visitors. More than 350,000 people attended the show at Chicago. The Louisiana exhibit comprised about 500 square feet of wall space and 300 feet of floor space, and was made up largely of specimens and samples of practically every farm crop grown in this State.

FERTILIZER AND FEED STUFFS LABORATORY.

Between forty-five hundred and five thousand official feed and fertilizer samples were analyzed during the year 1920. These samples were collected through the office of the Commissioner of Agriculture and represent shipments of all feeds and fertilizers sold in the State during the year.

All miscellaneous samples, sent by individuals, pertaining to agriculture, were analyzed free of charge. These included feeds, fertilizers, water, minerals, etc. Inspection and examination of animal carcasses for suspected poisons were made. Cases of feed adulterants were examined and reported on. Suspected cases of harmful fertilizer ingredients were taken up and the fertilizers in question analyzed.

Mr. Sam Byall, connected with the Fertilizer and Feed Stuffs Laboratory of the Experiment Station, for the past ten years, resigned his position September 30, to take up research work with Penick and Ford, of New Orleans. Mr. A. D. Lipscomb of Auburn, Ala., was added to the chemical staff in the spring of 1920.

SOIL LABORATORY.

The soil laboratory continued the routine work of examining and classifying soil types throughout the State, and also made examinations and estimates for soil requirements, of miscellaneous samples.

PUBLICATIONS

The following publications were issued during the year:

Experiment Station Bulletins.

No. 168—Anthrax (Transmission of Infection by Non-biting Flies), by Harry Morris.

No. 169—Effect of Fungi on the Germination of Sugar Cane, by C. W. Edgerton and C. C. Moreland.

No. 170—Factors Determining the Keeping Qualities of Cane Sugar, (With a Chart for Prediction), by N. Kopeloff.

No. 171—The Amount of Salt in Irrigation Water Injurious to Rice, by F. C. Quereau.

No. 172—Rice Investigations, by F. C. Quereau.

No. 173—The Clarification of Cane Juice Without Chemical Treatment, by F. W. Zerban.

No. 174—Tomato Wilt, by C. W. Edgerton and C. C. Moreland.

No. 175—The Prevention of Sugar Deterioration, by N. Kopeloff, C. J. Welcome and Lillian Kopeloff.

No. 176—A Method of Selecting L-511 Cane Free of the Mosaic Disease for Planting Purposes, by C. W. Edgerton.

No. 177—Chemical Composition of Some Louisiana Soils as to Series and Texture, by S. S. Walker.

ANNUAL REPORT SERIES.

Annual Report of Agricultural Experiment Stations for 1919.

JOURNAL ARTICLES.

The Prevention of Sugar Deterioration by the Use of Superheated Steam in Centrifugals. By N. Kopeloff. Jour. Ind. Eng. Chem.

Microorganisms in the Sugar Factory. By N. Kopeloff, Louisiana Sugar Planter *64*, 14-15, (1920).

Formation of Gum Levan, by N. Kopeloff, Jour. Bio. Chem. August, 1920.

The Invertase Activity of Mold Spores as Affected by Concentration and Amount of Inoculum. By N. Kopeloff and S. Byall. Jour. Agr. Research, *18* 10, 537-542.

The Effect of Concentration on the Deteriorative Activity of Mold Spores in Sugars. By N. Kopeloff, Lillian Kopeloff and S. Byall. Jour. Ind. Eng. Chem. *12,* 3, 256-257. Louisiana Sugar Planter, *64* 270-1 (1920).

The Deterioration of Cuban Raw Sugar in Storage. By N. Kopeloff, Lillian Kopeloff and H. Z. E. Perkins. Jour. Ind. Eng. Chem. *12,* 6, 555.

The Importance of Some Coloring Matters in Cane Juices and Syrups. By F. W. Zerban, Jour. Ind. Eng. Chem.

CHANGES IN STAFF

The following changes in personnel of the Station Staff were made during the year:

W. R. Dodson, Director, resigned August 1919, effective January 1, 1920. W. H. Dalrymple, Vice-Director and Veterinarian of the Experiment Stations was appointed to succeed him.

F. W. Zerban, Research Chemist at the Sugar Station, New Orleans, resigned April 1, 1920. Position still vacant.

N. Kopeloff, Bacteriologist at the Sugar Station, New Orleans, resigned July 1, 1920. No appointment has been made to fill this position.

G. H. Hopkins, Assistant Chemist, at the Sugar Station, New Orleans, appointed January 1, 1920; resigned April 1, 1920.

C. J. Welcome, Assistant Chemist, Sugar Station, appointed February 1, 1920; resigned June 1, 1920. W. G. Raines, appointed to succeed Mr. Welcome.

Sam Byall, Assistant Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge, resigned September 30, 1920, to accept a commercial position.

E. A. Maier, Farm Manager at the Station at Baton Rouge, resigned November 30, 1920, to accept a position on a large sugar plantation near Baton Rouge.

Sidney Stewart was appointed Farm Manager at the North Louisiana Station, Calhoun, July 1, 1920.

H. H. Winters, appointed as Assistant to the Superintendent of the Rice Station, June 1, resigned September 30, 1920.

Gerard Dikmans was appointed Parasitologist and Asst. Veterinarian September 1, 1920.

T. H. Jones was appointed Entomologist of the Stations, July 1, 1920.

W. G. Bradley was appointed Assistant Entomologist, September 15, 1920.

A. A. Ormsby, Specialist in Exhibits, was appointed July 1, 1920.

Mrs. Helen Hardy was appointed to the position of Mailing Secretary October 15, 1920.

E. K. Breeden was appointed Farm Manager at the State Station, to succeed E. A. Maier.

A. D. Lipscomb was appointed Assistant Chemist in the Fertilizer and Feed Stuffs Laboratory, February, 1920.

FINANCIAL STATEMENT

Hatch and Adams Funds.

	Hatch Fund	Adams Fund
Dr.		
Received from the Treasurer of the United States, as per appropriation for fiscal year ending June 30, 1920, under Acts of Congress approved March 2, 1887, (Hatch Fund) and of March 16, 1906, (Adams Fund)	$ 15,000.00	$ 15,000.00
Cr.		
By Salaries	6,998.25	11,173.15
Labor	4,011.39	400.00
Publications	1,105.36	
Postage and Stationery	239.80	39.39
Freight and Express	79.82	70.50
Heat, Light, Water and Power	359.51	301.73
Chemicals and Laboratory Supplies	7.50	1,010.26
Seeds, Plants and Sundry Supplies	834.09	153.08
Feeding Stuffs	431.09	225.63
Library	2.77	83.25
Tools, Machinery and Appliances	355.92	2.75
Furniture and Fixtures	8.75	92.25
Scientific Apparatus and Specimens		741.61
Live Stock	20.00	10.50
Traveling Expenses	72.19	674.65
Buildings and Land	473.56	21.25
Total	$ 15,000.00	$ 15,000.00

STATE FUND.

Statement of receipts and expenditures of the State Fund from January 1, 1920 to December 31, 1920:

Receipts.

State Treasurer	$37,250.00
*Sales	7,886.50
Refunds	1,556.09
Interest on Daily Balance	302.10
Transferred from Fertilizer Fund	6,000.00
Total	$52,994.69

Expenditures.

Salaries	$13,799.86
Labor	14,546.25
Publications	1,042.49
Postage and Stationery	597.38
Freight and Express	474.63
Heat, Water and Light	1,446.34
Chemical Supplies	11.00
Seeds and Sundry Supplies	2,432.02
Fertilizers	181.21
Feed Stuffs	1,564.54
Library	25.98
Tools, Implements and Machinery	4,290.95
Furniture and Fixtures	306.30
Scientific Apparatus and Specimens	
Traveling Expenses	1,823.08
Live Stock	1,964.48
Contingent Expenses	2,481.69
Buildings and Repair	2,580.99
	$49,569.19
Deficit January 1, 1920	3,241.26
	$52,810.45
Balance on hand, Dec. 21, 1920	184.24
Total	$52,994.69

*The amount reported under *sales* should not be counted as additional revenue, as, to a very large extent, it represents merely a turn-over of other funds, and may, in some cases, represent a loss, if the products disposed of should bring less than the cost of their production as experiments.

FERTILIZER AND FEED STUFFS FUND.

Statement of the receipts and expenditures of the Fertilizer and Feed Stuffs Fund, from January 1, 1920 to December 31, 1920:

Receipts.

Commissioner of Agriculture	$27,335.65
Refunds	199.12
Balance on Hand, January 1, 1920	4,517.53
Total	$32,052.30

Expenditures.

Salaries	$13,731.32
Labor	2,391.77
Postage and Stationery	650.55
Freight and Express	143.37
Heat, Light and Water	932.17
Chemical Supplies	2,155.86
Seeds and Sundry Supplies	464.40
Feeding Stuffs	113.58
Fertilizers	439.90
Library	57.77
Tools, Implements and Machinery	215.85
Furniture and Fixtures	281.00
Scientific Apparatus	767.48
Traveling Expenses	521.72
Contingent Expenses	226.04
Building and Repairs	346.02
Total	$23,438.80
Transferred to State Fund	6,000.00
	$29,438.80
Balance on hand, December 31, 1920	2,613.50
Total	$32,052.30

EXPERIMENT STATION DAIRY.

Statement of Receipts and Expenditures of the Experiment Station Dairy Fund from January 1, 1920 to December 31, 1920:

Receipts.

Milk	$ 3,558.20
Live Stock	2,382.55
Miscellaneous	408.08
Total	$ 6,348.83
Cash on hand, December 31, 1919	484.99
Total	$ 6,833.82

Expenditures.

Labor	$ 2,584.89
Seeds and Sundries	939.62
Fertilizers	74.82
Feeding Stuffs	1,568.45
Tools, Implements and Machinery	83.23
Live Stock	830.00
Buildings and Repair	618.97
Total	$ 6,699.98
Cash on hand, December 31, 1920	133.84
Total	$ 6,833.82

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State College
of Washington
Library

THIRTY-THIRD ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

TO THE GOVERNOR

FOR 1921

By

W. R. DODSON, Director

January 28, 1922.

To His Excellency, John M. Parker,
Governor of Louisiana.

Sir—I have the honor to submit herewith, the annual report of the Agricultural Experiment Stations of the Louisiana State University and Agricultural and Mechanical College, for the year 1921.

As required by act of Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional funds for research work at the experiment stations of the several states, a financial statement is appended, for the year beginning July 1, 1920 and ending June 30, 1921.

Respectfully,
W. R. DODSON,
Director.

EXPERIMENT STATION STAFF

W. R. DODSON, A. B., B. S., Director.
W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterinarian.
W. G. TAGGART, B. S., Assistant Director, Sugar Station, New Orleans.
A. F. KIDDER, B. S., Assistant Director and Agronomist, Baton Rouge.
G. D. CAIN, B. S., Assistant Director, North La. Station, Calhoun.
J. MITCHELL JENKINS, B. S., Superintendent Rice Station, Crowley.
C. W. EDGERTON, Ph.D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
HARRY MORRIS, D. V. M., Bacteriologist and Veterinarian, Baton Rouge.
G. DIKMANS, Parasitologist and Assistant Veterinarian, Baton Rouge.
T. H. JONES, B. S., Entomologist, Baton Rouge.
W. G. BRADLEY, B. S., Assistant Entomoogist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
R. W. AXT, B. S., Assistant Horticulturist, Baton Rouge.
J. F. BREWSTER, Ph.D., Research Chemist, Sugar Station, New Orleans.
WM. L. OWEN, B. S., Bacteriologist, Sugar Station, New Orleans.
W. G. RAINES, Assistant Research Chemist, Sugar Station, New Orleans.
A. P. KERR, M. S., Chief Chemist, Fertilizer and Feed Stuff Laboratory, Baton Rouge.
W. P. DENSON, B. S., Assistant Chemist, Baton Rouge.
J. H. JOLLY, B. S., Assistant Chemist, Baton Rouge.
A. D. LIPSCOMB, B. S., Assistant Chemist, Baton Rouge.
C. R. HUMMEL, B. S., Assistant Chemist, Baton Rouge.
J. L. FARR, M. S., Assistant Chemist, Baton Rouge.
R. P. SWIRE, Treasurer.
MRS. RUTH HEIDELBERG, Secretary, Baton Rouge.
A. A. ORMSBY, Specialist in Exhibits, Baton Rouge.
R. C. CALLOWAY, B. S., Superintendent of Dairy Farm.
MRS. HELEN HARDY, Mailing Secretary, Baton Rouge.
J. K. McHUGH, Stenographer, Sugar Station, New Orleans.
E. K. BREEDEN, Farm Manager, State Station, Baton Rouge.
SIDNEY STEWART, Farm Manager, North La. Station, Calhoun.
ALVERTA WRIGHT, Stenographer, Rice Station, Crowley.

GENERAL REMARKS

During the summer months Dr. W. H. Dalrymple's health became so impaired that he tendered his resignation as Director of the Experiment Stations and Dean of the College of Agriculture. Dr. Dalrymple has very ably served the Experiment Stations and the University for nearly thirty years, the past two years as Director and Dean. With less exacting duties he is making marked improvements in health and is now able to devote practically full time to the miscellaneous duties of correspondence, advisor, and Associate Director.

The writer, in response to an invitation of the Board of Supervisors, extended through President T. D. Boyd, returned to the University on the 10th of October, 1921, under an agreement by which he may give the greater portion of his time to the duties involved in the expansion of the agricultural work of the University. We are not, at this time, prepared to make recommendations regarding the readjustment of Station and College work.

STATION NO. 1

Sugar Experiment Station, Audubon Park, New Orleans.
W. G. Taggart Ass't. Director in Charge.

SUGAR CANE WORK

In 1921 the seasons were more favorable than the previous year and slightly better labor conditions prevailed. However, labor had not yet reached normal and we had to content ourselves, to a large extent, with second-class farm help. Some of the work which was temporarily dropped in 1920, was again taken up but on account of expectation that the Station would be moved at the end of the year, a part of the field work was left out of our plans.

After almost two years of effort we have been able to permanently reorganize our staff, on which two important vacancies had existed, due to resignations. Dr. J. F. Brewster, formerly connected with the U. S. Bureau of Chemistry, was induced to accept the position of Research Chemist. Mr. W. L. Owen, who formerly had done notable work in our bacteriological laboratory, and later was with a large canning company, returned to his former position with the Station.

The yield of sugar cane was better than that of last year, but still not as good as we had been accustomed to get. The cause of the poor yield no doubt was due to some extent, to diseases. While this condition prevents us from making as good a showing in the eyes of the public as we would like, it at the same time affords us opportunity to get in closer touch with these parasites that are threatening the sugar industry. While this condition may not be altogether to our liking, we appreciate the opportunity and are trying to take full advantage of it; and after all, our work is experimental, not demonstrative. The yield of cane, due to the usual application of nitrogenous fertilizers in its several forms, again gives variable results. Ammonium nitrate gave highly profitable returns, and was followed closely by calcium cyanamid, nitrate of soda and sulphate of ammonia. Of the organic nitrogenous materials, cottonseed meal gave better returns than tankage. The double ration of phosphoric acid (72 pounds) gave better returns than a single ration (36 pounds). It is gratifying to see that planters are duplicating this experiment on their plantations. Two experiments out of three in which a complete fertilizer containing 90 pounds of sulphate of potash per acre, gave better results than the check, which was equivalent quantities of nitrogen and phosphoric acid. The third of these experiments showed a loss where the complete fertilizer was applied. Work with clovers on fall plant cane was continued, and the results showed the necessity of inoculating cleaned sweet clover seed, whereas we have not found it necessary to inoculate when seed in the hull was used. Benefit from sweet clover was clearly visible along the outer edges of the plat, or in other words, near where this crop had grown wild the year before. No nodules could be found on clover in the center of the plat, and no benefit to the cane could be seen. Crimson clover planted on fall plant cane again smothered the cane. We now have sufficient data on that crop to again recommend the use of it as a fall cover crop on fall plant cane.

Sweet clover on fall plant cane was applied on several thousand acres of cane last year.

L 511 cane again showed a high sucrose content and resistance to mosaic disease, but was badly damaged by some unknown cause. Tonnage from it was extremely disappointing. A good number of other seedlings were found to be resistant to mosaic disease. These have been set aside for further test.

Special study of the mosaic disease of sugar cane, and the effect of selecting seed was made by the Station Pathologist. This work has been carried on for two years, and the data so far at hand are encouraging. No means have yet been found to measure the damage done by the disease.

A plat of ground was assigned to the Station Entomologist for studies of corn insects in this latitude, as compared with that of Baton Rouge.

The Planter's Annual Field Day was largely attended, and was in every way a success.

Assistance was given to a number of farm implement manufacturers and inventors having new implements in development for use on sugar plantations.

The U. S. Department of Agriculture Bureau of Entomology still assigns two of its men to our Station. Mr. T. E. Holloway reports that the Cuban parasite which was imported by his department, has withstood Louisiana winter conditions and that parasites have been found on seventeen plantations, where they were put out the year before. And, more encouraging still, that on another plantation where parasites were released two years, ago, a parasite was found which indicates that it is quite possible for this beneficial insect to adapt itself to the Louisiana climate.

Mr. E. R. Barber of the Bureau of Entomology, reports that his department has made and shipped to points in Louisiana, Alabama and Mississippi, from this Station, over five thousand gallons of ant poison, and that about thirty-five miles of the City of New Orleans, which is more than half its area, has been covered with ant poison. He estimates that this work will save about $16,000 in commercial ant poison and additionally, about half a million dollars wastage to the people living within the controlled area.

RESEARCH CHEMICAL DEPARTMENT

A new method of control of the sulphitation process in the manufacture of white sugar was tried in large-scale practice at the Station sugar house, with satisfactory results. The new method of control consists in the use of suitable indicator solutions to determine the proper end points of treatment with sulphur dioxide and with milk of lime. The method is simple of execution and is much less time-consuming than the present method of titration.

In all the present methods of cane juice clarification a precipitate or cloudiness forms in the syrup upon evaporation, which interferes with the obtaining of high grade sugar unless it can be removed. This is accomplished by filtration of the syrup. A study has been made of the formation of this precipitate. The results obtained indicate that precipitation depends upon the temperature to which the syrup is heated during evaporation. By heating to near the boiling point of water, precipitation is made complete and settling is rapid, thereby facilitating its removal.

The very interesting coloring matter which gives to the rind of Louisiana purple cane its color, has been isolated and is being studied. This dyestuff belongs to the same class of compounds, the anthocyans, which are responsible for the red, purple and blue colors of the petals of flowers and the skin of fruits. The effects of the presence of this dyestuff upon the color of cane juice, syrup and sugar house products will be studied.

Results of experiments by W. G. Raines in conjunction with Dr. C. E. Coates, indicate that a very high grade decolorizing carbon suitable for sugar refining may be obtained from sugar cane bagasse. This subject had been previously studied by others, but the importance of the results had not been fully appreciated at the time. There is thus added another cheap and plentiful raw material to the list of substances which may be used for the production of decolorizing carbons.

DEPARTMENT OF BACTERIOLOGY.

Work in the bacteriological department was suspended during approximately half of the past year, due to the vacancy caused by Dr. Kopeloff's resignation. Dr. Church, who had been temporarily assigned to the Station, returned to the Bureau of Chemistry in March, and a bacteriologist was not appointed until August. Dr. Church during the short time that she was in charge, made substantial contribution to the problems of sugar deterioration. As a result of her investigations, a clearer understanding was obtained regarding the source of infection of sugar products, the distribution of micro-organisms in these sugars, and in the molasses separated from them, and the efficiency of superheated steam in the centrifugals, as a means of improving the keeping qualities of sugars. The investigations in this department since their resumption, have for the most part consisted in a continuation of the phases of sugar deterioration that were initiated by Dr. Kopeloff. Special attention has been directed towards determining the part played by mold spores in causing sugar deterioration, and the possible value of the steam process as a means for improving the keeping qualities of various types of sugars. Much experimental work has also been carried out on the meaning of the "Factor of Safety" of sugars, when translated into terms of physical and chemical qualities of the molasses film around sugar crystals. From the data that have been secured so far, it seems likely that the investigations now in progress will serve to explain many apparently inconsistent examples of deterioration of sugars which should have kept well, as well as those cases of sugars not deteriorating which by all indications should have. The completion of this investigation should result not only in furnishing a basis for a more accurate prediction of the behavior of sugars in storage, but should lead to an improved method of sugar manufacture, by means of which Louisiana sugar can be held indefinitely without fear of deterioration in quality.

In addition to the investigation of sugar deterioration, considerable attention has been given to the investigation of the conditions affecting the formation by bacteria of gum lavan from sugar solution. This work is intended as a confirmatory test of some of the experimental data published in Bulletin No. 125, but carried out in the present instance by methods that afford a more accurate chemical estimate of the changes produced. The results so far entirely confirm the results obtained in the earlier investigations. The work has, to only a slight degree, an ultimate utilitarian purpose. It will undoubtedly contribute some data of practical value on the nature of the changes in the fermentation of cane juice. Its chief purpose, however, which is purely scientific, is to trace the course of development of the acquired power of gum formation by a group of bacteria which ordinarily lacks this power; whether this ability is rapidly acquired, or whether it is of a gradual transition, determined by an environment of specific chemical and physical composition, is what we are endeavoring to learn.

Preliminary investigations on the bacterial flora of cane juices, and the types of fermentation to which this product is most susceptible, with special reference to dextran formation, are also in progress.

STATION NO. 2

Baton Rouge, La.

A. F. Kidder, Agronomist and Assistant Director in Charge.

The work of the State Station in 1921 was devoted to agronomy projects almost entirely, the exception being in the Cost of Production studies.

FERTILIZERS

The fertilizer projects as reported in 1920 have been continued with no change. Organic matter in addition to cottonseed meal and acid phosphate, gave twice the yield in continuous corn cultivation as did the same materials without organic matter. Velvet beans in a two year rotation of cotton, oats and legumes, gave a larger yield of cotton than did either soybeans or cowpeas. Soybeans in corn, followed by cotton, in a two year rotation of corn and cotton produced considerably more cotton than adjoining plats given over to the same rotation without soybeans. Continuous cotton cultivation did not make enough to pay for the picking. Oats continued to give a good yield in both plats where this crop is grown every year, followed by soybeans in the summer.

CROP PRODUCTION

Breeding and selection was continued with cotton, corn and oats. Mass selection was continued with the long staple cotton (Louisiana No. 1) but pedigreed breeding will be done in 1922. The results have been very gratifying and it is hoped that more attention given to this new veriety will bring us to a point, in a few years, when it may be tried out over the State.

The Louisiana Hybrid 143, and Alex wilt-resistant have continued to be as promising, particularly in plats where the cotton wilt is present.

The yellow color in Calhoun Red Cob corn has been perfected. The hand pollinated corn of 1920 produced an exceptionally good yellow corn this past season. The work of producing a white cob in the White Calhoun corn is progressing favorably.

Breeding for a deep pinched dent and rather broad kernel in corn has been started. This kernel breeding is one of the most important projects in the corn work.

The oat nursery has been decidedly enlarged. Twelve hundred individual oat plants were selected during the harvest and were planted in the fall of 1921. Some very noticeable variations can be seen at the present time (December 1921). Twenty-five of the selections made in 1919 were worthy of further propagation.

Variety tests of oats, cotton and corn have been continued, as usual. Different varieties of cowpeas and soybeans are being planted for grain as well as for hay. The following new variey tests have been added: Sorghum, sugar beets, wheat, barley and rye.

This past season the six varieties of sugar beets produced a tonnage of nearly 20, with a sucrose content of 14 and a purity of 85. This was considered very good and the same varieties are being planted again.

Leaf spot attacked the barley and caused it to fail.

Different methods of cultivation have been started with corn. The same kinds of implements are used that one will find on various farms over the State. Other work on corn is to determine the effect of strength of germination upon the yield, and effect of time of planting upon the yield.

The planting of velvet beans in the same row as the corn, in every other row, and in every third row, is being continued. The yield of beans and corn has been considerably larger where both were planted in the same row, and no greater damage has been noticed in the corn.

In cooperation with several other southern experiment stations, "place effect" work in cotton was started this year.

The alfalfa breeding has been continued as mentioned in 1920 report.

COST OF PRODUCTION STUDIES

Keeping an accurate account of the cost of producing hog-grazing crops together with the cost of growing hogs, has given some very good data. Final results are obtained after hogs have gathered the different crops in the various plats.

STATION NO. 3

North Louisiana Experiment Station, Calhoun.
C. D. Cain, Ass't. Director in Charge.

The only new work added this year was a Place Effect test with different varieties of cotton, and a test of Weevil-nip. The samples of cotton from the Place Effect plats were sent to Professor A. F. Kidder of the State Station, and he sent them to the Alabama Experiment Station for comparison and study.

The Three Year Rotation Experiment where compost (made of cottonseed, stable manure and acid phosphate) was used, shows clearly that it is essential to have organic matter in the sandy soil of North Louisiana, in order to get favorable results with commercial fertilizer. The analysis of the compost used in the experiment was as follows:

Corn Compost		**Cotton Compost**	
Available phosphoric acid	5.85%	Available phosphoric acid	8.75%
Nitrogen	2.71	Nitrogen	1.42
Potash	1.80	Potash	1.28

The plats where compost has been used for a long time gave more than twice the yields in cotton, corn, oats, and pea vine hay of plats where commercial fertilizer was used alone.

In the fertilizer experiment where commercial fertilizer was used in connection with stable manure (6 tons of stable manure, 8 lbs. of nitrogen in cottonseed meal, 32 lbs. P_2O_5 in acid phosphate, 8 lbs. K_2O in potasium sulphate), the yield of cotton was increased about 15 % over plats where stable manure alone was used.

With corn, stable manure seems to be the most essential need for the sandy hill sections. With oats, a top dressing of 50 lbs. of sodium nitrate applied when the oats first came up, increased the yield of grain 20%.

The experiments with varieties of corn showed that the prolific varieties gave a little higher yield than the other varieties. Calhoun Red Cob seems to be one of the best varieties that we have.

Cotton variety tests showed that there are several varieties that have made good yields at this Station, such as Cleveland's Big Boll, Tir-Cook, Dixie Triumph, Allen's Cleveland, Wannamaker's Cleveland, Delta Type Webber 8985, Webber 49-4 and Express.

In the variety tests of soy beans, the largest yields for hay were made by Arlington and Virginia. They also seem to yield the largest amount of grain of any of the new varieties tried at this Station.

Grazing hogs on corn and soybeans gave 667.67 lbs. of pork per acre. The yield of beans was not estimated, but the corn supplemented by the beans gave 15.67 lbs. of pork for every bushel of corn. Where cowpeas were substituted for the soybeans in the grazing experiment, 12.3 lbs. of pork was obtained per bushel of corn.

We have threshed 322 bushels of velvet beans and 66 bushels of peas for the farmers in the community, on the Star Pea and Bean Huller that was purchased in 1919. This has encouraged more farmers to take an interest in these legumes and has enabled them to get them on the market.

In order to get a general idea of the milking capacity of some of our grade Shorthorns, the following records for two months period are given:

Half Shorthorn
(White)

Dropped calf June 8.
August 1921: 784 lbs. milk or average of 2.94 gallons. Feed: Pasture and 10 lbs. molasses mixed feed per day.
September 1921: 716.75 lbs. of milk or average of 2.78 gallons of milk per day. Feed same as in August.

Half Shorthorn
(Brindle)

Dropped calf in March.
April 1921: Average per day 1.74 gallons.
May 1921: Average per day 1.89.
Feed: 2 lbs. C. S. hulls; 3/ lbs. Velvet bean hulls and ½ lb. C. S. meal.

NORTH LOUISIANA AGRICULTURAL SOCIETY

Monthly meetings of the North Louisiana Agricultural Society were held from March to October, inclusive. Greater interest was shown in the meetings this year on account of the preparations for the fair, which was held in October 19-20-21. Considering the fact that the fair had not been held at Calhoun since 1916, and also the financial condition of the community and the condition of the roads at the time of the fair, the exhibits were very creditable.

STATION NO. 4

Rice Experiment Station, Crowley, La.
J. M. Jenkins, Superintendent in Charge.
Conducted in cooperation with the Bureau of Plant Industry, United States Department of Agriculture.

The following list of projects comprise the experimental work at this Station:

Work with rice varieties:

Under irrigation and under dry cultivation.
Nursery studies, covering several hundred.
Testing under field conditions on 1-10 acre basis.
Distribution, and study of promising varieties in co-opera- with farmers.

Cultural experiments:

- Date of seeding.
- Rate of seeding.
- Manner of seeding.
- Character of seed bed.

Irrigation experiments:

- Date of application of irrigation water.
- Depth of application of irrigation water.
- Daily loss of water at different depths in plats.
- Daily loss of water in tanks.

Fertilizer experiments:

- Sources of nitrogen.
- Sources of phosphoric acid.
- Application of lime.
- Application of potash.
- Application of manure.
- Application of complete fertilizers.

Rotation experiments:

- Two-year with rice and soybeans.
- Two-year with rice and pasture.
- Four-year with rice, oats, corn, and soybeans.

Diseases of rice:

- "Straighthead."

Meteorological data:

- Evaporation.
- Precipitation.
- Wind velocity.
- Daily temperature, maximum and minimum; Humidity.

The accumulating results obtained in most of the projects are rather conclusive, and give evidence of definite information for the benefit of the rice industry in general. This is especially true in the matter of new varieties, cultural, fertilizer, rotation experiments, and investigations pertaining to straighthead. The demand for seed rice varieties introduced by the Station, was much in excess of the supply. Millers are showing a readiness to buy these varieties. This has stimulated their popularity very much.

The Station has distributed soybeans as in the past. During this year, a great interest was shown by local farmers and if the price of rice remains low, the evidences are that soybeans will become, in course of time, a regular crop on the rice farm.

The Bureau of Entomology of the United States Department of Agriculture is cooperating with the Station and has placed a permanent representative here to devote his entire time to a study of insects affecting rice.

During the year, the Pathologist employed by the National department, to investigate rice diseases, was transferred to other lines of work, leaving the Station again without one directly responsible for this line of work.

A preliminary report on some of this work was made in the form of a Farmer's Bulletin, issued by the Office of Cereal Investigations, with the Pathologist in charge and the Station Superintendent as joint authors. This bulletin is entitled "Straighthead of Rice and Its Control."

In place of a general assistant, a stenographer was appointed for this Station, assuming her duties January 1, 1921.

There were no new buildings erected or any notable equipment added during the year, save the purchase of a Ford sedan for the use of the Station.

We lost one horse during the year, which reduced our live-stock to four mules and one horse.

Representatives from foreign countries continue to visit this Station in search of information that might be of value in their respective countries. During the year we had four from Brazil, three from Japan, three from China, and one from the Phillipine Islands.

DEPARTMENT OF PLANT PATHOLOGY

Baton Rouge.

C. W. Edgerton, Pathologist in Charge.

C. C. Moreland, Assistant.

During 1921, the work in the Department of Plant Pathology was, in general, along the same lines as in previous years. Most of the available time was concentrated on a few definite projects though some attention was given to other important problems of the State. The work was set back to a considerable extent by the fire which destroyed the Experiment Station laboratory in November. Records of much of the work were destroyed. Fortunately, a portion of the results on some of the projects had been written up and published in bulletin form during the year.

SUGAR CANE DISEASES.

The investigations on sugar cane diseases have dealt largely with the mosaic diseases. A number of trips were made through the sugar belt and data on the spread of the disease were obtained. The disease is now present in practically all parts of the sugar belt. Traces of it appeared in the Bayou Teche region during the spring and by fall the disease was rather common in that region. This is the latest region to become affected.

At Audubon Park a number of experiments on this disease were carried on during the season. The object was to determine the relative resistance of the different varieties and to study the effect of the disease on the same cane from year to year. A special study was also made of the L 511 cane. This cane is specially resistant to the mosaic disease but unfortunately the past season has not given as high yields as was hoped for. The method of selecting disease free stalks of this variety for planting purposes worked very successfully, not only at Audubon Park but also on several plantations in the State. Some investigations on the mosaic on corn were also started.

TOMATO WILT

A three years' test of the effect of the wilt disease on various tomato varieties and selections was brought to a close and the results published in bulletin form. The wilt-resistant selections which have been developed at the Experiment Station have given the most satisfactory results on wilt-infested soils. These selections have been sent out over the State and are being used more and more each year. There is a very heavy call for this seed from various parts of the State. During the past season the Horticultural Department grew several pounds of this seed and this is being distributed for planting in 1922.

EGGPLANT BLIGHT

The results on the work on the eggplant blight were published in bulletin form during the early part of the year. The work itself was discontinued at the end of the preceeding season.

CORN DISEASES

The work on the corn diseases that are present in the State has developed along several lines. Hundreds of cultures of fungi have been isolated from seed corn and corn plants. Furthermore, corn seed known to be affected with certain organisms has been used in field trials. Data including the condition of the corn, the presence of various root rotting organisms and the germination were obtained in order to compare with the actual results obtained in the field. Unfortunately, most of the data obtained were lost in the fire. This work will be continued on a larger scale during the season of 1922.

Also during the year, some seed treatment experiments and some hybridization experiments between resistant and non-resistant strains were started. The hybrid corn obtained was destroyed by the fire and this work will have to be duplicated.

OTHER WORK

Some cooperative work was carried on with the Horticultural Department on the mosaic disease of Irish potatoes. Notes were taken on the behavior of various lots of certified seed which were tried in the State. A preliminary bulletin on this work was published during the year.

Investigations on an onion disease which causes a heavy loss in Lafourche and adjoining parishes was brought to a close and the results were published in bulletin form. This work was started in cooperation with the Bureau of Entomology and the Extension Division but was later turned over entirely to the Department of Plant Pathology.

The Plant Disease Survey work was continued during the year. This work is in cooperation with the Plant Disease Survey of the U. S. Bureau of Plant Industry.

DEPARTMENT OF ANIMAL PATHOLOGY

Baton Rouge

DIVISION OF BACTERIOLOGY.

Harry Morris, Bacteriologist and Veterinarian in Charge.

The work in the Division of Bacteriology during 1921 was, in general, continued along lines previously reported, consisting of investigations of some of the important animal diseases of the State. Practically all material carrying cultures, and laboratory records were lost in the Experiment Station fire, November 3, nevertheless, it is possible to draw from memory, some conclusions from the accumulated data gained from experiments concerning the life history of the micro-organism of anthrax.

(1). Anthrax bacilli remained virulent for guinea pigs for a period of twelve years while suspended in water taken from the University Lake.

(2). Anthrax remained virulent in milk for a period of ten years. This specimen of milk had been taken from the udder of a cow that died of anthrax ten years ago.

(3). Anthrax spores remained virulent for a period of nine years in dog feces. The dog had been fed virulent anthrax spores, feces collected in glass jar retainers and examined once a year.

(4). Commercial anthrax (spore) vaccine had been collected in the laboratory for some four years. In the majority of samples, the virulence of the spores did not seem to be reduced by age.

Soil samples were collected from the garden during the year 1919 and inoculated with anthrax spores. The samples were placed in the incubator at a temperature of 37.5°C and enough water to thoroughly moisten the soil was added every six weeks. The continued heat and dessication did not seem to affect the organism, as virulent anthrax could be isolated at the conclusion of the experiment.

Concerning the examination of blood smear for anthrax.

(a). A dried blood smear is not suitable material for making cultures or animal inoculations, as the vegetative form of anthrax is soon killed by drying. Negative results should not be taken as conclusive evidence that the blood was not taken from a charbonous carcass.

(b). Negative results obtained from cultures made from decomposed blood or flesh are not conclusive evidence for making a negative diagnosis. The vegetative form of anthrax is destroyed by decomposition.

(c). In making a positive diagnosis of anthrax from a stained blood smear some of the micro-organisms should always show a capsule formation. The organisms resembling anthrax found in the blood do not show capsule formation.

During the summer months anthrax developed in some of the parishes in the northern part of the State. The disease seemed to occur to a great extent among horses and mules; the loss among cattle was very small. Observations of the outbreak would indicate that the infection was probably due to blood-sucking insects, as only the thin-skinned animals were affected. No serious outbreaks of the disease were reported from the southern part of the State.

The usual number of specimens were received at the laboratory for examination. A great many of the blood smears sent in to be examined for anthrax had been taken from carcasses dead of Texas fever.

By the continued use of anthrax vaccine and observing the common rules of sanitation, the Station passed the tenth year without a case of anthrax among the live stock.

SWINE DISEASES

A study of the diseases of swine other than hog cholera, has been continued. Infectious colitis has been found in several herds. The cause of the disease is not known but unsanitary surroundings always accompany the disease. Hemorrhagic septicemia has not been found in swine, although several outbreaks of the disease were reported and specimens were sent to the laboratory for examination.

INFECTIOUS ABORTION IN CATTLE

Infectious abortion in Guinea pigs was given some study. Arthritis, orchitis, sterility and abscess formation in the orbital cavity with complete destruction of the eye ball was noted. Specimens, notes and photographs were all destroyed in the fire of November 3.

Through the excellent work of the Superintendent of the Dairy, infectious abortion continues to be held in check, with the loss of very few calves, although during 1919 the loss was nearly one hundred per cent. In this control work on abortion the rules of sanitation have been followed as closely as possible and no medical remedies used.

INFECTIOUS DIARRHEA OF CATTLE

A study of infectious diarrhea of cattle was continued during the past year. Protozoa were grown on culture media and fed to calves and smaller animals with negative results. Outbreaks of the disease in the State were observed and the sick animals treated with intestinal antiseptics. Recovery was rapid with the disappearance of the protozoa from the feces of the infested animal.

DIVISION OF PARASITOLOGY

Dr. G. Dikmans.

The work in animal parasitology has proceeded along the lines indicated when the work was first begun. During the year frequent visits were made to the Baton Rouge Municipal Abattoir for the purpose of obtaining material for examination.

Owing to the writer having to hold classes during the college session, the work was considerably interfered with, from the standpoint of the Experiment Station, as he was prevented from making investigation trips throughout the State during that period. Besides, there was a delay in obtaining some of the needed apparatus. However, his vacation period, during parts of August and September was spent in Washington, D. C., at the laboratories of the Zoological Division of the Federal Bureau of Animal Industry, through the courtesy of the Chief of the Division, in order to study some of the material in the Washington collection of animal parasites, and to obtain some assistance in the identification of some parasites collected locally. The results of the work accomplished at Washington were published as Bulletin No. 183, of the Louisiana Experiment Station, requests for which have been numerous since its publication.

The description of a new species of stomach worm reported from South America and Europe but heretofore not found in the United States, is given in the bulletin referred to.

The examination of material collected locally from calf stomachs is proceeding as rapidly as possible, and a report on this phase of the work will be made in the near future. Later a study of the intermediate hosts of different parasites will be made, followed by practical tests for control measures.

The sequence of the work on parasitology, therefore, which has been commenced and will be followed, is: (1) The identification of the internal parasites of our domesticated animals; (2) their classification; (3) an investigation of their intermediate hosts—some of which have not yet been discovered; and (4) control measures for each species or variety.

DEPARTMENT OF ENTOMOLOGY

Baton Rouge.
Thos. H. Jones, Entomologist in Charge.
W. G. Bradley, Assistant.

The research work during the year 1921 was confined to the following insects:

INSECTS INJURIOUS TO CORN

The Southern corn root worm or budworm. Observations were made on the life history and habits of this insect and, in cooperation with the Agronomist of State Station, Baton Rouge, and the Assistant Director, in charge of the Sugar Experiment Station, New Orleans, planting of corn were made at intervals during the spring of 1921, to ascertain whether time of planting had any bearing on the degree of infestation. At the State Station, Baton Rouge, experiments were also conducted to ascertain whether certain substances applied to corn seed at planting time were of value in reducing injury.

The rice weevil or black weevil. Observations were made on various types of corn cribs built in the State, with the idea of giving satisfactory conditions for storage and for fumigating the contents with carbon disulphid for the control of the weevil and other insects that injure corn in storage. Information concerning the construction of these cribs, and their value as containers for storing and fumigating corn, was obtained.

INSECTS INJURIOUS TO LIVE STOCK

Horse flies and deer flies. Progress was made, by means of collections and observations in the field, in ascertaining what species are injurious. Information was also obtained concerning various habits of some species in the larval and adult stage.

The collection of injurious insects particularly those of Louisiana, used both for display purposes and in connection with the identifications of insect material sent in by correspondents, was considerably increased. In this work special attention was given to the scale insects, concerning which numerous requests for information as to control are received.

Numerous letters, asking for information relative to various insects, have been received and answered. A number of articles concerning some of the more important insect pests have been given to the press and two extension circulars, one having to do with the grassworm and one with the webworm, have been published.

The cooperative work with the Bureau of Entomology, United States Department of Agriculture, on truck crop insects, begun in 1914, has been continued, C. E. Smith of the Bureau of Entomology being stationed at Baton Rouge during 1921 in connection with this work.

The Department, as well as the Bureau of Entomology, United States Department of Agriculture, lost all of its equipment including apparatus, specimens, notes, and literature, kept in the building occupied by the Experiment Station laboratories when this building was destroyed by fire on November 3, 1921.

HORTICULTURAL DEPARTMENT

Baton Rouge.

G. L. Tiebout, Horticulturist in Charge.

R. W. Axt, Assistant.

The leader in horticulture divides his time between Experiment Station and Extension work. An assistant, Mr. R. W. Axt, was appointed March 1, 1921.

The Legislature of 1920 authorized the establishment of a branch experiment station in the Florida Parishes. Arrangements have been concluded for the location of this station, near Hammond, La., the center of the strawberry-producing territory and a large truck-growing section. The Parish of Tangipahoa is providing the farm and permanent improvements and the Experiment Stations will operate it from the general funds appropriated for the Stations.

The people of the Seventh and Eighth Wards of Tangipahoa Parish have voted a tax of one-quarter mill for three years, as a bonus for helping to properly get this work under way.

IRISH POTATO SEED IMPROVEMENT

The object of this investigation, in cooperation with the United States Department of Agriculture, is to determine the actual value or superiority of certified or inspected seed stock over uncertified or uninspected stock as ordinarily offered to the southern grower by the seed dealers in his community.

Five lots of certified Triumph seed were furnished from Wisconsin and six lots from Nebraska. These were planted with five lots of uncertified Triumph seed purchased from dealers at four Louisiana seed-distributing centers. The season was favorable and the average yield of certified over uncertified seed was very marked. Ten out of the eleven lots of certified seed were good and several very superior. One lot was a decidedly low yielder, showing 98.9% mosaic disease infection. Four out of five of the uncertified lots were inferior. On the whole, the results showed a decided superiority of the certified over the uncertified seed.

The mosaic disease appears to be the greatest menace to Triumph potato production in the South. Information to date would indicate that this disease develops to a much greater degree in the South than in the northern potato seed-producing areas. High certification standards, especially with regard to this disease, must be maintained in order to give reasonable protection to the Triumph potato grower in the South. The seed improvement work has been in progress in Louisiana for three years. Experiment Station Bulletin No. 181, "The Mosaic Disease of the Irish potato and the Use of Certified Potato Seed," was issued during the past year.

LOUISIANA CREOLE ONION IMPROVEMENT.

Our Louisiana Creole onion, so exclusively grown in the southern part of the State, is sadly in need of improvement, as casual inspection of commercial lots would indicate. Improvement by selection for uniformity in size, color, shape, maturity, and other desirable characteristics, was begun this year. Selections were made from flowering bulbs and twenty-three lots of seed were saved for planting the following fall.

VARIETY TESTS OF ANNUAL FLOWERS.

A total of ninety-six varieties of fifty-five different kinds of annual flowers were planted during the spring for observations as to season, blooming period, color, use, etc. Information as to annual flowers of easy culture, best suited for farmstead ornamentation in this State is sought. The exceptionally late spring and the unusually hot summer that prevailed, more than likely caused considerable variation in results.

PRODUCTION OF SEED OF WILT RESISTANT TOMATOES FOR DISTRIBUTION AMONG FARMERS.

About eight pounds of seed of the Station's Louisiana Red, Louisiana Pink and the Norton, were harvested for distribution. Recipients of small amounts of this seed will be required to sign a pledge that they will save their own supply in the future. It is hoped that some commercial seed grower will undertake the production of seed of these wilt-resistant varieties introduced by the Station so that the seed can be offered through the usual trade channels.

RHUBARB AND SWEET CORN FOR THE HOME GARDEN

Work with rhubarb to determine the total yield, number of pullings, and length of season from one-year old Linnaeus seedling roots from the North was continued. Results show that the rhubarb roots are not perennial here under normal exposure. The heat of late spring and early summer appears to be primarily responsible for the destruction of the roots. The yield indicates that rhubarb can be successfully produced by importing roots each season.

The experiments with sweet corn embracing two varieties, Howling Mob and Stowell's Evergreen, for home gardens, are still under way. Successional planting periods, yield, earliness and thinning distances are points under observation. Results indicate that good strains of certain varieties of sweet corn can be grown with good results in home gardens over an extended period. The results are contrary to the prevailing opinion that sweet corn cannot be grown in this section. Observations show that the corn earworm, for which no satisfactory methods of control have been found, is a very menacing factor. The worm, however, usually leaves a liberal supply for family consumption.

Field and greenhouse, for the cooperative work of the Bureau of Entomology of the United States Department of Agriculture, as well as for the Department of Plant Pathology, of the Experiment Stations, have been furnished and the usual routine work incident to maintenance and progress has received attention.

EXPERIMENT STATION DAIRY

Baton Rouge.

R. C. Calloway, Superintendent.

Herd improvement, experiments in feeding dairy cattle, growing feed crops, soil improvement, and a few other minor operations go to make up the essential work of the Dairy.

The herd was managed in practically the same way as it had been in previous years. It has been gradually improved by the use of better sires and through the Register of Merit and herd record work. Seventeen cows in the herd have register of merit records. One Jersey cow in the herd has recently completed a record of 603 pounds of fat and 12,084.9 pounds of milk. She was bred and developed at the Dairy Farm.

During the year, 8 females and 6 bulls were sold, and three were lost by accident. These, 17 in all, represent the number raised or replaced in the herd for the year, since the number in the herd at present, is the same as last year.

Only four abortions occurred in the herd during the year and it is reasonable to presume that the disease is fairly under good control.

FEEDING EXPERIMENTS

The two experiments that were begun last year were completed.

(1). The feeding of Blackstrap molasses to young calves was completed in February. From this experiment it was concluded that sugar cane molasses is not laxative when fed with grain. Besides being nutritious in itself, it is a good appetizer, has a tonic effect, tends to make the grain more palatable, thereby causing the calves to consume larger quantities of grain and drink larger quantities of water. It is an excellent conditioner for calves, regulates the bowels and improves the quality of the skin and hair.

In conducting this experiment, it was an easy matter to compute the cost of raising the calves. The average cost of raising a calf to six months of age without molasses was $64.00 and with molasses, $54.00. However, the object of this experiment was to test the physical effect of the Blackstrap molasses and not the commercial feeding of calves.

(2). Rough rice as a feed for dairy cows.

The chief object of this test was also to find out if any injurious effects would result from the feeding of ground rough rice to milk cows. The concentrates used in this mixture consisted of 80% rough rice which was ground into a coarse meal.) This mixture was fed 60 days, plus the preliminary period, and with no ill effects whatever, that could be observed, on the digestive organs of the animal.

The test ran for 60 days. The average daily ration consumed by the six cows receiving corn meal, cottonseed meal and wheat bran was 10.4 pounds. That consumed by the six cows fed rough rice and cottonseed meal was 9.7 pounds. The average daily milk yield per cow, during the 60 day period, in the group receiving corn meal, cottonseed meal and wheat bran, was 24.5 pounds. That of the group getting rough rice and cottonseed meal, was 22.5 pounds. Owing to the palatability of the rice mixture, it is reasonable to presume that if the naimal had eaten as much of the rice mixture as of the corn mixture, the milk yield might have been as much in one case as in the other.

"Pifine" meal vs. alfalfa hay when mixed with molasses:

"Pifine" meal is a product of Paille Fine grass, which grows in large quantities along the Gulf Coast marshes. The grass is cut, sunned, ground, dried in steam rolls, and mixed with molasses. The Paille Fine, after it is dried, is a great molasses carrier, as it will absorb as much as 70% of its weight of molasses. So far, in this test, the results obtained are very gratifying when compared with alfalfa.

CROPS

The feed crops grown on the Dairy farm consisted mainly of hay, root crops, some grain, silage and green oats for winter pasture. The acre of alfalfa that was planted in February, 1920, was allowed to stand the second year. The alfalfa was cut four times and yielded about 4 tons of well cured hay, making 9 tons in the two years. In September, the ground was plowed and prepared for root crops. One-half was sown in stock beets, one-fourth in rutabagas and the other one-fourth in purple top turnips. The seed were sown in October and in December the turnips were ready to be fed. They yielded at the rate of 14 tons per acre.

Seven tons of oat hay were harvested after the oats had been grazed until March 1. Eight hundred bales of mixed hay, lespedeza and grass were saved.

The grain crops consisted of corn, soy beans, and velvet beans. The corn was harvested and saved for the work stock, while the soybeans and velvet beans were left in the field to be harvested by the cattle.

The silage crop consisted of corn and Biloxi soybeans; 12 acres averaged 10.7 tons per acre. The 12 acres after silage, were sown in oats in September for winter pasture. We began pasturing the oats in the latter part of November.

SOIL IMPROVEMENT

All the manure that could possibly be saved for the past six years, has been applied on two fields. These two fields have improved wonderfully in production over fields that have had no manure. Other fields have been improved by the use of leguminous crops.

STATE FAIR EXHIBITS.

One of the most important demonstrations that the Dairy supervised, was the demonstration at the State Fair, of the profitable and unprofitable dairy cows. Two cows that were bred and developed at the Dairy farm, and of which records of their production had been kept, were selected for this demonstration. For each cow a chart was made out, which gave the amount of feed consumed, the quantity and value of products returned, and the profits derived when both whole milk and butter were sold. This demonstration attracted the attention of a great many visitors to the Fair and it was felt by those who originated the idea and installed the exhibit that a great deal was accomplished towards eliminating the unprofitable cow from the dairy herds in Louisiana.

DEPARTMENT OF EXHIBITS

A. A. Ormsby, Specialist in Charge.

In the interest of the State Experiment Stations during the year 1921, several visits were made by Mr. Ormsby to the Stations at Crowley, Audubon Park and Calhoun, as well as to be the Iberia Live Stock Farm at Jeanerette, for the purpose of investigating the work of the various stations and assisting the superintendents in charge in the selection and preparation of material for exhibition purposes.

With an appropriation of approximately $300, a joint exhibit of the activities of all four of the experiment stations was made at the State Fair of Louisiana in October. This exhibit covered a floor area of about 600 square feet, with an equal amount of wall space, showing results that have been accomplished by the Experiment Stations and recommending better methods of farming and live stock raising.

In cooperation with the Louisiana State University, the State Department of Agriculture and the State Department of Conservation, the Experiment Stations joined in extensive exhibits of agricultural products and natural resources at the Illinois State Fair, Springfield, Ill., August 19-27; at Wisconsin State Fair, Milwaukee, August 29 to Sept. 3; and at the International Live Stock Exposition, Chicago, Ill., November 26 to December 3, inclusive. The total attendance at these three large expositions exceeded 1,000,000 persons.

The Department of Fairs and Exhibits is maintained jointly by the State Experiment Stations, the Louisiana State University and the State Department of Agriculture.

FERTILIZER AND FEED STUFFS LABORATORY

Baton Rouge.

A. P. Kerr, Chief Chemist.

The fiscal year for the Feed and Fertilizer laboratory ended August 31, 1921. A total of 2138 feeds and 1900 fertilizers samples were reported to the Chief Inspector as official analyses. In addition to these, miscellaneous analyses of feeds, fertilizers, soils, poisons, waters, minerals, etc., which would make a total of approximately 4500 analyses, were made.

The personnel of the laboratory was unchanged with the exception of the addition of J. L. Farr, M. S., L. S. U., 1921, as Assistant Chemist, to replace E. C. Thomas, M. S., L. S. U., 1919, who resigned to accept a position with the Hawaiian Sugar Planters' Association, located at Honolulu.

Due to the disastrous fire that destroyed the laboratory on November 3, a number of valuable records pertaining to soil, feed and fertilizer analyses were lost. These records took years to accumulate and are practically irreplacable.

The laboratory is now located in the old band hall, adjacent to the river, just north of the barracks buildings. While the equipment is not as complete as before, the laboratory is more compact and up-to-date and capable of turning out a larger amount of work than before.

PUBLICATIONS

The following publications were issued during the year:

Experiment Station Bulletins:

No. 178—Eggplant Blight, by C. W. Edgerton and C. C. Moreland.

No. 179—Feeding Rough Rice to Horses, Mules, Hogs and Dairy Cattle.

No. 180—Feeding Blackstrap Molasses to Calves, by R. C. Calloway.

No. 181—The Mosaic Disease of the Irish Potato and the Use of Certified Potato Seed, by C. W. Edgerton and G. L. Tiebout.

No. 182—Onion Diseases and Onion Seed Production, by C. W. Edgerton.

No. 183—Preliminary Notes on Parasites Found in Ruminants, by G. Dikmans.

No. 184—Tests of Wilt Resistance of Different Tomato Varieties, by C. W. Edgerton and C. C. Moreland.

Annual Report Series:

Annual Report of Agricultural Experiment Stations for 1920.

FINANCIAL STATEMENT

HATCH AND ADAMS FUNDS

Dr.	Hatch Fund	Adams Fund
Receipts from the Treasurer of the United States, as per appropriations for the fiscal year ended June 30, 1921 under acts of Congress approved March 2, 1887 (Hatch Fund) and March 16, 1906, (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By Salaries	$ 7,970.75	$ 9,574.35
Labor	3,232.10	411.60
Publications	833.60	
Postage and Stationery	72.21	20.92
Freight and Express	10.10	44.31
Heat, Light, Water and Power	195.53	577.38
Chemicals and Laboratory Supplies		975.21
Seeds, Plants and Sundry Supplies	270.67	287.73
Fertilizers	551.05	
Feeding Stuffs	737.88	167.69
Library	17.00	326.72
Tools, Machinery and Appliances	178.08	15.97
Furniture and Fixtures	20.00	446.25
Scientific Apparatus and Specimens		1,687.62
Traveling Expenses	185.00	454.08
Contingent Expenses		
Buildings and Lands	726.03	10.17
Total	$15,000.00	$15,000.00

STATE FUND

Statement of Receipts and Expenditures of the State Fund, from January 1, 1921 to December 31, 1921.

Receipts

State Appropriation	$50,000.00	
Refunds	1,954,85	
Interest on Daily Balance for six months	131.81	
Sales	6,466.93	
Loan from Evangeline Bank & Trust Co.	1,400.00	
Springfield Insurance Company	2,350.00	
Phoenix Insurance Company	1,000.00	
Northern Insurance Company	14,000.00	
Balance on Hand, January 1, 1921	184.24	
Total		$77,487.83

Expenditures

Salaries	$23,085.48	
Labor	16,459.62	
Publications	1,018.10	
Postage and Stationery	553.27	
Freight and Express	455.55	
Heat, Light and Water	1,040.96	
Chemical Supplies	65.15	
Seeds and Sundries	1,783.27	
Fertilizers	626.05	
Feed Stuffs	1,815.26	
Library	71.17	
Tools, Implements and Machinery	1,943.78	
Furniture and Fixtures	561.45	
Scientific Apparatus	683.89	
Live Stock	333.09	
Traveling Expenses	2,731.83	
Contingent Expenses	6,918.51	
Building and Repairs	4,518.90	
	$64,665.33	
Transferred to Fertilizer and Feed Stuffs Fund, for insurance on chemicals and apparatus	7,000.00	
	$71,665.33	
Balance on Hand December 31, 1921	5,822.50	
		$77,487.83

FERTILIZER AND FEED STUFFS FUND

Statement of Receipts and Expenditures of the Fertilizer and Feed Stuffs Fund from January 1, 1921 to December 31, 1921.

Receipts

Harry D. Wilson, Commissioner of Agriculture	$23,673.28	
Refunds	116.81	
Balance on Hand January 1, 1921	2,613.50	
Transferred from State Fund for Insurance collected on Chemicals and Apparatus, Destroyed by Fire Nov. 3, 1921	7,000.00	
Total		$33,403.59

Expenditures

Salaries	$16,021.74	
Labor	2,558.00	
Publications	217.15	
Postage and Stationery	788.87	
Freight and Express	136.81	
Heat, Light and Water	970.67	
Chemical Supplies	1,654.95	
Seeds and Sundries	313.42	
Fertilizers	496.85	
Library	33.31	
Furniture and Fixtures	1,021.60	
Scientific Apparatus	749.60	
Traveling Expenses	220.06	
Contingent Expenses	25.00	
Building and Repairs	1,447.24	
Total	$26,655.27	
Balance on Hand December 31, 1921	6,748.32	
		$33,403.59

EXPERIMENT STATION DAIRY FUND

Statement of Receipts and Expenditures of the Experiment Station Dairy Fund from January 1, 1921 to December 31, 1921.

Receipts

Sale of Milk	$ 5,284.44	
Sale of Live Stock	2,316.60	
Miscellaneous Sales and Refunds	179.17	
Balance on hand January 1, 1921	133.84	
Total		$7,914.05

Expenditures

Labor	$ 3,058.89	
Seeds and Sundries	1,272.24	
Feeds	1,875.56	
Tools, Implements and Machinery	130.12	
Live Stock	1,150.00	
Buildings and Repairs	53.21	
Total	$ 7,540.02	
Balance on Hand, December 31, 1921	374.03	
		$7,914.05

THIRTY-FOURTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

TO THE GOVERNOR

For 1922

BY

W. R. DODSON, Director

June 9, 1923.

To His Excellency, John M. Parker,
Governor of Louisiana.

DEAR SIR:

I have the honor to submit herewith, the annual report of the Agricultural Experiment Stations of the Louisiana State University and Agricultural and Mechanical College, for the year 1922.

As required by act of Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional funds for research work at the experiment stations of the several states, a financial statement is appended, for the year beginning July 1, 1921, and ending June 30, 1922.

Very respectfully,

W. R. DODSON,
Director.

EXPERIMENT STATION STAFF

W. R. DODSON, A. B., B. S., Director.

W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterinarian.

W. G. TAGGART, B. S., Ass't Director, Sugar Station, New Orleans.

A. F. KIDDER, B. S., Agronomist and Ass't Director, Baton Rouge.

SIDNEY STEWART, Superintendent, North Louisiana Station, Calhoun.

J. MITCHELL JENKINS, B. S., Superintendent, Rice Experiment Station, Crowley.

B. SZYMONIAK, B. S., Horticulturist, Fruit and Truck Station, Hammond.

C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.

HARRY MORRIS, D. V. M., Bacteriologist and Ass't Veterinarian, Baton Rouge.

T. H. JONES, B. S. Entomologist, Baton Rouge.

W. G. BRADLEY, B. S., Assistant Entomologist, Baton Rouge.

G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.

J. F. BREWSTER, Ph. D., Research Chemist, Sugar Station, New Orleans.

WM. L. OWEN, Ph. D., Bacteriologist, Sugar Station, New Orleans.

A. P. KERR, M. S., Chief Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.

W. P. DENSON, B. S., Ass't Chemist, Baton Rouge.

J. H. JOLLY, B. S., Ass't Chemist, Baton Rouge.

J. L. FARR, M. S., Ass't Chemist, Baton Rouge.

COMPTON R. HUMMEL, B. S., In Charge of Records, Baton Rouge.

R. P. SWIRE, Treasurer, Baton Rouge.

MRS. RUTH HEIDELBERG, Secretary, Baton Rouge.

R. C. CALLOWAY, B. S., Superintendent of Dairy Farm, Baton Rouge.

J. K. McHUGH, Stenographer, Sugar Station, New Orleans.

E. K. BREEDEN, Farm Manager, State Station Farm, Baton Rouge.

PIERRE HERNANDEZ, Ass't Agronomist, Baton Rouge.

C. C. MORELAND, B. S., Ass't Plant Pathologist, Baton Rouge.

ALVERTA WRIGHT, Stenographer, Rice Station, Crowley.

STATION NO. 1

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS.

W. G. TAGGART, Ass't Director in Charge.

SUGAR CANE WORK.

The work done at this station during the year was conducted with the strictest economy. In order to carry on all of the investigations possible with a decreased appropriation, it has been necessary to refrain from keeping up the general appearance of the station grounds that ordinarily is desirable.

FERTILIZER TESTS.

Work with nitrogeneous materials was discontinued for the time being; this being necessary in order that the plat set aside for such work could be used for growing 2500 new seedling canes.

Phosphoric acid tests gave results that are somewhat out of line with our usual findings. Two rations of 72 pounds phosphoric acid with 36 pounds of nitrogen (tankage as source) gave an increase of five tons over a check of no fertilizer. One ration of phosphoric acid with one of nitrogen gave an increase of 5.6 tons. A duplicate of this experiment in which nitrate of soda was used as the source of nitrogen gave only 0.83 of a ton increase where two rations of phosphate were used, and 4.31 where one ration was used. These yields are somewhat higher than usual in the case of one ration, and much lower than usual in the case of two rations. Two experiments out of three showed good gains where 90 pounds of sulphate of potash were used with nitrogen and phosphoric acid; the highest being 2.13 tons per acre, and the other 1.76. The third experiment showed a loss of 0.08 tons per acre. With cane valued at five dollars per ton, the monetary value of this experiment shows that the $2.52 invested in potash returned a net gain per acre of $6.28 in one instance, $8.03 in one, and a loss of $2.56 in one. Averaging the canes of the three experiments, a net gain of $3.75 per acre is shown. The ratio of suckers to stalks from planted eyes again is in favor of potash, with potash it being 2.2 to 1, while without potash, 2.09 to 1. A question as to whether the potash in the potassium sulphate or the sulphur therein was responsible for the increase in yields in previous years, has been raised by several interested parties. In order to answer it, duplicate experiments were conducted in which the same amount of sulphur as is carried in 90 pounds of sulphate of potash was used with nitrogen and phosphoric acid, but no potash. No increase in the weight of cane harvested was shown.

Work with *Mellilotus Indica* as a catch crop was continued with good returns. A portion of the clover grown for this purpose was turned under on March 2, and the balance on March 20. The amount of clover turned under on March 20 was measured to determine the tonnage of green matter and the pounds of nitrogen per acre secured. It was found that 21,722 pounds of green clover per acre, containing 3,660 pounds of dry matter, had been grown, and that the clover carried with it into the soil 104.69 pounds of nitrogen. The check plat produced 10.46 tons of cane, the plat where clover was turned under on March 2, 14.08 tons of cane, and the plat where clover was turned under March 20, made 16.36 tons per acre. The average stand of cane per acre where no clover was turned under at harvest time was 16,203 stalks, where clover was turned under March 2, 18,951 stalks, and where clover was turned under March 20, 19,413 stalks. These figures show clearly that clover on fall plant cane will not injure the stand of cane when the clover is gotten off properly. The value of the increased tonnage of cane in the last experiment is $29.50 per acre, at five dollars per ton for cane, and the cost of 20 pounds of clover seed for one acre, and extra work, could not exceed $3 per acre. It is reported that all the clover seed that could be secured by our sugar planters was planted on fall plant cane last fall.

VARIETIES AND SEEDLINGS.

Twenty-five hundred new seedlings were received at the station from the Bureau of Plant Industry, United States Department of Agriculture, in April and May and were planted. Approximately 1700 of these came through the year without showing the effect of mosaic disease, and have been planted again. Analyses of as many of the new canes as could be handled were made and some of them appear to grow rich enough in sucrose to be worth our attention. Nine of the older seedlings and one foreign variety showed very near immunity to mosaic disease, and the acreage planted to them was increased to the limit of cane grown. These canes will receive special attention, and it is hoped that at least one of them will relieve the critical condition brought about by mosaic disease.

Two lines of work were conducted on mosaic disease, both of them in cooperation with the Plant Pathologist. One of these experiments consisted in growing canes from healthy seed in comparison with canes grown from diseased seed, using varieties that were susceptible to the disease. Canes germinated from disease free seed came up healthy, but by harvest time were all diseased; but even then the damage by the disease was reflected. The average of two experiments using Purple cane, all healthy seed, was 16.54 tons, whereas the average from two experiments using the same variety of cane, but all diseased seed, was 15.78 tons. One experiment using D-74 healthy seed, gave 13.59 tons, against 9.54 tons from diseased D-74 seed.

The second and more important investigation consisted in selecting immune strains of D-74, Purple and L-511. This work has been carried on for several years, and is making such a good showing that it is being expanded, and recommended as a commercial proposition to the plantation owners. Results of this experiment show increase of 2.52 tons with Purple, 3.42 tons with D-74, and 2.49 tons with L-511, where the selected canes were grown in comparison with the general run of seed.

The annual Field Day of the Louisiana Sugar Planters' association was held in July, and was voted a success by those in attendance.

W. G. Raines, Jr., Assistant Chemist, resigned December 1, to go into the industrial field. No successor has been named.

ENTOMOLOGICAL DEPARTMENT

T. E. Holloway, Bureau of Entomology.

Cooperation in insect investigation has been maintained with the Bureau of Entomology, U. S. Department of Agriculture. In a statement issued to sugar journals in June, the theory was advanced that the heavy damage from the sugar cane borer *(Diatraea saccharalis crambidoides Grote)* each year is largely due to the hibernation of many borers in the planted seed cane, the moths emerging through the soil in the spring and depositing their eggs on the young plants. To destroy the borers in seed cane quite an elaborate series of experiments with a number of chemicals was conducted, but it was found that no substance was effective under field conditions.

A chance suggestion, however, was made the basis of other work in which there is some promise. Dr. E. W. Brandes, of the Bureau of Plant Industry, wished to ship uninfested seed cane from an infested section in Florida to a place in Georgia where the borer does not occur. He had the idea that soaking the cane in moderately heated water for a short time might kill the borers, and asked that the entomologists at the station conduct experiments along this line. Cane containing borers was soaked in water heated to various temperatures, being left for various lengths of time, and it was found that a temperature of 50 degrees centigrade (122 degrees Fahrenheit) for 20 minutes, killed all borers without injuring the germination. In fact, the germination was hastened, and some treated cane planted in October germinated so satisfactorily that in December there was a stand as good as that usually secured in June. Three varieties of cane were used, and comparing their germination with untreated cane planted at the same time, it was found that there was an increase in germination of from 191 to 264 per cent. This offers great promise to the sugar planters, not only in controlling the cane borer but in prolonging the growing season and securing a better stand of cane.

Inspections of fields at various plantations were made in the fall for the Cuban parasites (*Euzenilliopsis diatraeae* Townsend) which were brought from Cuba in 1919 and 1920 by the Bureau of Entomology cooperating with a number of sugar planters. Parasites were found at 14 plantations, and it is likely that they occur at several others, as they have been found elsewhere during other years. Few parasites were found, but to continue their existence it is necessary that they make a constant attack on the cane borer, and this is of great benefit. It seems that they may have accomplished more in lessening the damage from the borer than can definitely be ascribed to them.

Another parasite (*Habrobracon brevicornis* Wesmael) received through the kindness of Dr. L. O. Howard, Chief of the Bureau of Entomology, was reared and released during the year. This was a parasite brought from southern France in the work against the European corn borer in the northern states. Dr. Howard thought that it would attack the sugar cane borer, and this was found to be correct. About 1500 of the parasites were released at a plantation near New Orleans, but it has not yet been found that they attacked the borers in the fields

At a farm where little cane is grown, but where corn suffers greatly from the borer every year, examinations were made to determine the source of this infestation. It was found that borers were hibernating in so-called "broom sedge" (*Andropogon glomeratus*), and it is likely that with the destruction of this harboring plant around the edges of the fields the borer damage would be considerably reduced.

The Bureau of Entomology is investigating sugar cane insects not only in Louisiana, but in Texas, Mississippi and Georgia, but headquarters for all this work is maintained at the Sugar Experiment Station at Audubon Park.

CHEMICAL RESEARCH DEPARTMENT

Dr. J. F. Brewster, Chemist.

Initial clarification of cane juice as it comes from the mill is perhaps the most important step, from the chemical point of view, in the manufacture of sugar. Upon the thoroughness of the clarification depends the ease of operations which follow and the quality and yield of the final products.

A trial was made in the grinding season of 1921-22 of the efficiency of kieselguhr alone in clarification. Excellent clear juice is thus obtained, but the resulting sugar cannot be washed white. The color is always slightly yellow.

During the past grinding season, 1922, an innovation in the use of lime and sulphur in juice clarification was tried. The mill juice being first limed to neutrality, heated and settled in the usual manner, the clear juice then being lightly sulphured. This treatment yields a white sugar and it is thought that less impurities are introduced than when the usual procedure of sulphuring and then liming is carried out. Some necessary laboratory work on this process is now being conducted.

Preliminary tests upon bagasse char as a filtering medium have been made and these, having shown promise, will be completed.

In cooperation with one of the large sugar refineries an analytical method for the determination of moisture in raw sugars was tried. The results indicate that the time of this determination may be materially shortened.

Two new pieces of apparatus, which may be of general use to chemists, were devised at the Sugar Experiment Station laboratory. One is an internally heated vacuum pan for conducting evaporation under reduced pressure, the other is a simple check valve for use with the water vacuum pump.

BACTERIOLOGICAL RESEARCH DEPARTMENT

WM. L. OWEN, Bacteriologist.

The investigations that have been carried out in this department during the past year have, with few exceptions, been essentially the same as outlined in the report for 1921. Some of the investigations have been completed and the results submitted for publication in various scientific journals. New projects have been substituted for these, and are to be included with the uncompleted investigations in our program of work for the coming year. The work of this department as a whole has been almost exclusively confined to a study of the problems of sugar deterioration in storage, with the purpose of devising means for its prevention. The principal project of the department has been and will continue to be a direct study of this problem. The selection of the secondary lines of investigation has been with a view of improving our opportunities for the successful solution of our main problem by building a broader foundation of knowledge from which to proceed further. The investigations that have received attention in the department during the past year and the progress that has been made, are as follows:

THE DETERIORATION OF SUGARS BY MOLD FUNGI.

A study of thirty species of mold fungi isolated from various sugars showed that they varied greatly in the rate at which they caused sugar to deteriorate, and in their moisture requirements. A point of practical significance in connection with this fact is that the amount of moisture a sugar may contain without undergoing deterioration will depend upon the species of mold with which it is infected. A study was made of the extracts from all of these species, and some of these extracts were found to be capable of causing the inversion of sucrose at densities at which the mold from which the extract was taken was incapable of development. *Aspergillus repens* was the most active inverting type of any of the species that were studied. The results of this investigation are now ready for publication.

A STUDY OF THE FORMATION OF GUM LEVAN IN SUCROSE SOLUTIONS BY BACTERIA COMMONLY OCCURRING IN RAW SUGAR.

The purpose of this investigation was to ascertain whether sucrose or invert sugar is the source of gum levan formed in this type of fermentation so prevalent in the products of cane sugar factories. The results showed that sucrose, and not its inversion products, is the source of gum levan. The reaction of limed juice is more favorable for this fermentation than either the raw or the sulphured juice. The results of this investigation have been submitted for publication in the Journal of Bacteriology.

A STUDY OF THE EFFECT OF MANUFACTURING CONDITIONS UPON THE KEEPING QUALITY OF SUGARS.

The purpose of this investigation was to determine the manufacturing conditions necessary to produce sugars that conform in composition to the "factor of safety." The results obtained show that the manufacture of sugars conforming to this factor depends upon beginning with a sirup of such a purity that when exhausted as far as practicable it will leave a film of exhausted molasses surrounding the sugar crystals. This film will be unsuited both in density and purity for the development of microorganisms, and hence the sugar will not deteriorate in storage unless it absorbs more moisture. The results of this investigation are now appearing as a series of articles in the International Sugar Journal of London.

INVESTIGATION OF THE PREVENTION OF SUGAR DETERIORATION IN STORAGE.

This investigation has been vigorously prosecuted during the past year, and very promising results have been obtained. Many experiments were carried out on the value of pasteurization as a means of preventing sugar deterioration, but the results have not been consistently favorable. Experiments on the inhibitory effects of carbon dioxide gas upon the mold fungi found in sugar, have yielded some very promising results. One of the most important phases of the problem of the deterioration of sugars is their moisture absorbing properties. A study of this phase of the problem has been carried on during the past year. Through the courtesy of Mr. George P. Meade, of the Cardenas Refinery of the Cuban-American Sugar Company, five samples of Cuban 96 test sugar of measured and standardized grain, representing sizes Nos. 3 to 7 inclusive, were obtained for study. The rate of moisture absorption of these samples was studied under varying conditions of humidity. A similar study of plantation white sugar is soon to be undertaken. Samples of these sugars were obtained from a large number of plantations throughout the State during the present grinding season, and much interesting data is expected to result from a study of them.

A STUDY OF THE ACTION OF VARIOUS VEGETABLE CARBONS IN THE REMOVAL OF MICROORGANISMS FROM JUICES AND SIRUPS IN THE PROCESS OF CANE SUGAR AND SIRUP MANUFACTURE.

The current claims regarding the effect of vegetable decolorizing carbons in preventing the fermentation of cane juice and sirups, are lacking in scientific verification. It was for the purpose of determing the value of these apparently extravagant claims that this investigation was undertaken. The work has been conducted on a laboratory scale during the recent grinding season, and the results obtained are of much interest. Norit, Darco and Suchar are the carbons that are being used in the investigation.

A STUDY OF THE OCCURRENCE IN LOUISIANA SUGAR HOUSES OF BACTERIA DEVELOPING AT HIGH TEMPERATURES.

A recent investigation of the clouding of clarified juice in Hawaii resulted in the isolation of species of bacteria developing at temperatures as high as 165°F., and at densities up to 25 Brix. During the recent grinding season, samples of raw and filtered juices were stored at high temperature, but no indication of this action was observed. The work is to be continued during the year.

This department was fortunate in having the services of a free assistant during about seven months of the year. Mr. James U. Wilkinson, a vocational training student, acted as our assistant during that time, and rendered very valuable service. The present lack of assistance is particularly to be regretted at this time in view of the interesting and elaborate program of work outlined for this department during the coming year.

Mr. J. D. Bond, a graduate student of the University, spent about two months in the laboratory, carrying out some special work on molasses fermentation under the direction of this department.

STATE STATION

BATON ROUGE, LA.

FARM DEPARTMENT

A. F. KIDDER, Agronomist.
PIERRE HERNANDEZ, Ass't. Agronomist.
E. K. BREEDEN, Farm Manager.

The agronomy work in 1921-22 was along the same general lines as reported previously.

SOIL FERTILITY.

No change or addition to the soil fertility projects was made in 1922. The two plats comparing the application of a mixture of cottonseed meal and acid phosphate to continuous corn at different periods of growth and with and without organic matter, show the same general results; that is, the organic matter plat gave a considerably higher yield. A study of the soil of these two plats was begun this past winter in cooperation with the Collegiate Department of Agronomy. This study covers mainly the physical characteristics.

Velvet beans in comparison with soy beans and cowpeas for green manuring, continued to give better yields of cotton in the two-year rotation of cotton, oats, and legume. Soy beans sown in corn at the last cultivation increased the yields of cotton as in previous years. Continuous cotton was not profitable. Neither was cotton in a rotation of corn and cotton without a legume. In continuous corn cultivation with velvet beans, soy beans, and cowpeas for a legume, the largest yield was obtained with the velvet bean. The velvet bean appears to be a better green manure crop for corn and cotton on the bluff soils than soy beans or cowpeas.

The application of limestone with acid phosphate and raw rock phosphate on the bluff soils for alfalfa has given fairly good results. The source of phosphorus seems to make very little difference in the yield. No definite recommendations can be given, however, regarding the use of limestone on the bluff soils, for alfalfa or for any other crop, at this time.

CROP PRODUCTION.

Lespedeza has been grown successfully two years without re-plowing and re-seeding the crop. The third year a considerable amount of grass and weeds has come in, making the hay crop less profitable and the seed crop very much inferior. It is recommended that two year old lespedeza meadows be plowed and seeded to oats in the fall and re-seeded to lespedeza in the spring. This cannot be carried on indefinitely, but on good land may be repeated several times.

The variety tests of corn, cotton, oats, soy beans, and sugar beets have been continued. The corn varieties are planted at the rate of 5800, 6900 and 8700 plants per acre. The prolific varieties can be planted considerably thicker than the large eared varieties.

The long staple cotton varieties have not produced as high a yield as the short ones, but the value of the crop is slightly higher because of the premium offered for staple cotton. This work has not been continued sufficiently long to make definite recommendations regarding the variety for the bluff soils.

The Station strain of the *Patterson oats* has continued to give the best results among the oat varieties. This variety is recommended to the farmers.

Sugar beets were as promising as reported in 1921. Earlier planting produced larger yields per acre.

Biloxi and *Mammoth Yellow soy beans* have given the largest yield of seed. Otootan, Virginia and Barchet varieties are better for hay. It seems at the present time that the Ebony soy bean may be used for early seed production. Many other varieties have been planted but none have proven as good as those mentioned.

Corn and Velvet Beans planted in every row has produced a larger yield of corn and practically the same amount of velvet beans as when planted in every other row or two rows of corn and one row of beans.

In cooperation with the office of Forage-Crop Investigations, Bureau of Plant Industry, U. S. Department of Agriculture, more intensive work with the clovers was started in the fall of 1922. No results are ready for publication.

In planting corn at different dates, early planting has given the highest yield for two years, and less damage from insects and diseases has been noted. This project is in cooperation with the Station Entomologist.

The "Place Effect" cotton project, in cooperative agreement between the U. S. Department of Agriculture and several southern Experiment Stations, has been continued. The Alabama Station has charge of the ginning and the U. S. Department of Agriculture has charge of grading, determining the length of staple and the per cent of staple.

PLANT BREEDING.

Individual selection of cotton plants with Louisiana No. 1 has been continued. Last season several thousand plants were available for work. Field and laboratory notes are made on all promising plants. The selections are made on the basis of earliness, yield, per cent of lint, length of lint, resistance to disease, etc.

Individual plant selection and hybridization has been continued with oats. A few progeny of selections made in 1919 are still worthy of keeping in the nursery. Field selections are made every other year and only the most promising plants are kept in the nursery after the first year.

In cooperation with the Station Plant Pathologist, the improvement of corn by selection and hybridization has been continued. Yield together with stalk characteristics and disease resistance are given prominence. No data are ready for publication on this work at this time.

STUDIES ON COST OF PRODUCTION.

The cost of producing crops to be "hogged down" and of growing hogs from farrowing to marketing, has been discontinued. The data for the past three years are now in bulletin form and being issued as Bulletin No. 187. This project has been in cooperation with Dr. W. H. Dalrymple, Veterinarian.

DEPARTMENT OF PLANT PATHOLOGY

C. W. Edgerton, Pathologist.

During 1922 there was little change in the nature of the work in the Department of Plant Pathology from that of previous years. However, less time was given to the tomato wilt and more to the sugar cane and corn projects.

Besides the regular project work, considerable time was given to the equipment of the new laboratory and to the procuring of photographs and specimens of the various plant diseases of the State. This was necessary as a result of the fire of the previous year which destroyed everything in the department laboratory.

The projects receiving attention in 1922 were those on sugar cane diseases, corn root rot and tomato wilt. Besides these, as usual, some time was allotted to the plant disease survey and to the potato mosaic disease project of the Horticultural department. The projects on the Sclerotium wilt disease, the cotton wilt, and the alfalfa diseases received no attention other than general field observations.

SUGAR CANE DISEASE.

Most of the work on sugar cane has been on the mosaic disease. This disease is now in all parts of the sugar belt and is causing considerable loss. The work on the disease has been carried on at Audubon Park, New Orleans.

The work for several years has been directed towards procuring strains from our best varieties that are more or less resistant to the disease. The selected strains in the mosaic plots at Audubon Park produced from two to four tons to the acre more cane than the unselected. These plots were very striking and attracted considerable attention, from the sugar planters of the State. The work of the L-511 cane was also continued. This cane is the most resistant to infection of any of the commercial canes grown in the State. The work has shown that disease-free seed of this variety can be readily selected at planting time. Cane selected in this way has given an increased tonnage of ten to fifteen per cent.

CORN ROOT ROT.

The corn root rot work has been carried on in cooperation with the Station Agronomist. The principal work in 1922 was the testing out of two hundred ears of corn as to germination, yield, and the presence of the root rotting organisms in the seed. It is necessary to carry this work on through several seasons before reliable conclusions can be made. We are also testing out the possibility of selecting the corn for seed in the field early in the season in order to reduce the percentage of infection in the seed.

TOMATO WILT.

Tomato wilt work was practically confined to the growing of seed of the Louisiana Wilt Resistant varieties. These varieties are giving excellent results and it is now impossible to supply the calls for seed throughout the State. Several hundred packets of this seed were sent out by the Extension Department in 1922, with very favorable results. This season, 1923, over 2000 packets are being distributed. These varieties yield on an average of from two to three tons more to the acre than ordinary varieties and have given excellent results in all districts except in localities where troubles other than the wilt, principally the nematode root galls, have killed all varieties.

DEPARTMENT OF ANIMAL PATHOLOGY

W. H. Dalrymple, Veterinarian.

Harry Morris, Bacteriologist and Assistant Veterinarian.

During 1922 the work in the Department of Animal Pathology was continued along the lines previously reported. The fire in the latter part of the year 1921 was especially disastrous to this work, beacuse of the destruction of very valuable material regarding which years of accumulated data was becoming very valuable.

Some difficulty was experienced in obtaining new material for some projects.

Practically all of the anthrax has been renewed. A study of the blood-sucking insects as disseminators of anthrax has been carried on during the past year with the following results: Anthrax has been transmitted from guinea-pigs to other experimental animals by several species of Tabanus. The highest percentage of infections was obtained from T. Quinquevittatus. They proved to be ferocious feeders upon the horse, or experimental animals. Fifty per cent infections were produced when a single fly was permitted to feed upon an infected guinea-pig and afterwards transferred to a healthy one.

In a great many cases the internal form of anthrax was produced.

This fly is bright brown in color, and is very common in Louisiana during the summer months.

Anthrax was also transmitted by several other species of Tabanus, but the percentage of infections did not run as high as in the experiments above mentioned.

Several species were studied with negative results. Some would not feed in captivity.

All flies were collected from horses in the fields and woods, and identified by Mr. W. G. Bradley of the Entomology Department.

No serious outbreak of anthrax occurred in the State during the past year. This might be considered somewhat singular as the disease has usually made its appearance in overflowed sections following high water. However, it is probable that more widespread vaccination and the better observance of sanitary measures may have obviated previous conditions to a large extent.

Quite a number of specimens were examined at the laboratory during the season, but very few cases of anthrax were found.

By the continued use of anthrax vaccine, and observing the common rules of sanitation as far as possible, the Station passed its eleventh year without a case of anthrax among the livestock.

INFECTIOUS ABORTION.

The infectious abortion work was practically brought to a close by the complete eradication of the disease from the dairy herd. The calf crop has been normal during the past year; and it is hoped that this condition may continue, and that an abortion-free herd will be moved from its present quarters to the new College Farm.

The Department has conducted, during the year, quite a voluminous correspondence with stockowners throughout the State concerning veterinary and allied topics.

The Department suffered a great loss through the resignation of Dr. Gerard Dikmans, who left to take post-graduate work at the University of Minnesota. Dr. Dikmans was making a study of the parasites of livestock in the State, and a great deal of valuable information was obtained, which is being published in bulletin form as a preliminary report.

DEPARTMENT OF ENTOMOLOGY

Thos. H. Jones, Entomologist.

W. G. Bradley, Assistant Entomologist.

During the year 1922 the research work had to do principally with certain insects injurious to corn and to livestock in Louisiana. In addition to this work the collection of insects, particularly those of Louisiana, used both for display purposes and in connection with the identification of insect material sent in by correspondents, was considerably increased. Special attention in this respect has been given to the scale insects, collections and notes on forty-eight species occurring in the State now being available.

As usual, numerous letters, asking for information relative to various insects, have been received and answered. An article on the cottony-cushion scale, intended for publication as an extension circular, and a paper giving some of the results of our observations on horse flies, have been prepared. A few short articles relative to insects have also been given to the press during the year.

The cooperative work with the Bureau of Entomology, United States Department of Agriculture, on truck crop insects has been continued. Mr. C. E. Smith of the Bureau of Entomology, and Mr. Guy Fletcher, a student assistant, have been engaged in this work during the past year.

INSECTS INJURIOUS TO CORN.

Observations have been made on the life-histories and habits of the "Southern corn root worm", the "Corn earworm" and the "Sugar-cane moth borer", all of which are important insect pests of growing corn in Louisiana. Some attention has also been given to the "Rice weevil", or "Black weevil", in relation to the injury it causes to stored corn.

INSECTS INJURIOUS TO LIVESTOCK.

Considerable progress has been made on the project having to do with horse flies, especially in regard to the habits of the adults and immature stages of the various species. The habits of the immature stages of most of the species occurring in the State have been but imperfectly known and we have been able to secure some valuable information regarding them.

HORTICULTURAL DEPARTMENT

G. L. Tiebout, Horticulturist in Charge.

Since the reduction in the appropriation for the Experiment Stations, it has been necessary to discontinue some of the Experiment projects under way, and the work of the Horticultural department has suffered some curtailment. However, the new Fruit and Truck Experiment Station, situated near Hammond, began active operations in the spring of 1922, and the work to be done there will take the place of some of the projects that were under way at Baton Rouge.

TRIUMPH IRISH POTATO SEED IMPROVEMENT WORK.

The object of this investigation, in cooperation with the United States Department of Agriculture, is to determine the actual value of superiority of certified, or inspected, Triumph seed stock over uncertified or uninspected Triumph stock as ordinarily offered to the southern grower by dealers in his community. The inspection in connection with certified seed is usually performed by specialists of the Agricultural College of the State where the certified stock is grown, and the certificate is based on high standards determined by two inspections in the field and one in the storage bin.

This was the fourth year of the five year period for the progress of this test. Four lots of Nebraska certified Triumph seed and four lots of Wisconsin certified Triumphs as well as some lots from other states were planted for comparison with five lots of uncertified Triumph seed purchased from dealers at four Louisiana seed-distributing centers. The season was not very favorable, but the average yield of certified over uncertified seed was very marked, as in the previous year.

Some field tests conducted in Rapides parish also demonstrated the superiority of certified Triumph seed over uncertified stock of the same variety. Yields from Nebraska certified seed approched 250 bushels per acre—a record for that section.

Home-grown Triumph seed one year removed from Northern-grown certified seed of the same strain did not yield nearly as much as the new (northern-grown) seed. Under the general prevalence of the Mosaic disease in the Triumph variety, this test, after a period of years, may indicate that it does not pay to use home-grown seed for the early crop.

The Mosaic disease was about to wipe out the Triumph industry in Louisiana. Through information obtained largely from these tests, planters of early Triumph potatoes are regaining confidence in the industry and fifty to seventy-five car loads of certified Triumph potato seed, mostly from Nebraska, will be planted during the coming season.

This work in connection with certified Triumph seed potatoes has attracted national attention, and we are reputed to be leading the South in this line of activity. States other than Nebraska and Wisconsin, notably North Dakota and Montana, are becoming interested in the development of a market for their certified Triumph seed in the South, and various strains are being sent here for trial.

OTHER ACTIVITIES.

The Louisiana Creole onion seed improvement work, variety tests of annual flowers, production of seed of wilt resistant tomatoes of the Louisiana Red and Louisiana Pink varieties, and the culture of rhubarb and sweet corn for the home garden were continued during the past year.

FERTILIZER AND FEED STUFFS LABORATORY

BATON ROUGE.

A. P. KERR, Chief Chemist.

During the year 1922 the chemical laboratory made the analyses of 1,545 samples of feed stuffs and 2,085 samples of fertilizers. The analyses were made for the State Department of Agriculture.

The laboratory was called upon from time to time during the year, to make analyses for the other departments of the Station.

The amount of miscellaneous work, such as analysis of mineral waters, etc., has increased very largely during the last few months. A great many soils samples were sent to the laboratory for analysis and while these analyses may mean a great deal to one making a scientific study of some particular soil problem, they mean very little to the farmer, especially when taken in places without any history of their location.

During the year samples of mixed feeds were sent to the laboratory that were suspected of containing some kind of poison injurious to animals. Only a small percentage of these samples showed that they contained poison.

EXPERIMENT STATION DAIRY

BATON ROUGE.

R. C. CALLOWAY, Superintendent.

DEVELOPMENT OF THE HERD.

The present dairy herd has been developed during the past fifteen years from a few foundation cows, with an occasional purchase of new lines of breeding. The herd now consists of eighty-five animals, which includes twenty-nine Holsteins, owned by the Experiment Station, fourteen Holsteins owned by the University, thirty-nine Jerseys owned by the Experiment Station, one Jersey and one Guernsey owned by the University and one cross-bred owned by the Experiment Station.

Four young bulls of excellent breeding and splendid type were donated to the Governor for the University and these have received care and attention at the dairy. These bulls consist of one Jersey given by the Cap Rock Jersey Farm, Crosbyton, Texas; one Jersey given by the Idlehour Stock Farm, Lexington, Ky.; one Holstein given by Mr. J. J. Orr, Crosbyton, Texas; and one Guernsey given by Mr. Joe Trees, of Pennsylvania.

Ten Holstein cows in the herd are in the Advanced Registry. One held the State record in the senior four-year-old class, with a production of 10,201.4 lbs. of milk and 345.97 lbs. butterfat which is equal to 432.46 lbs. butter. Unfortunately we lost this cow by accident.

Several bull calves were given to boys calf club members of the State. Three of the cows added to the herd have proven to be very valuable animals, one especially, as she now holds the herd record for milk production, having produced 15,025 lbs. of milk and 560 lbs. of butter in 365 days.

Of the forty-one Jerseys in the herd, fourteen cows are in the Register of merit and several others are on test, with a good chance to gain the same distinction. One will be reported in a few days as a State champion in the two-year-old class, with a production of 9,246.3 lbs. of milk and 448.72 lbs. of fat. During the year six animals were sold for breeding purposes, seven died (mostly calves at birth), five were bought, two were exchanged, and five bulls and one heifer were given as prizes to calf club members.

The herd is kept for experimental, instructional, and demonstration purposes.

EXPERIMENTS.

Several feeding trials are being carried out. One consists of a ration of rice bran, cotton seed meal, and molasses, compared to one of corn meal, wheat bran, cotton seed meal and molasses. The former mixture proved slightly inferior. A feeding trial of stock beets against corn and soy bean silage is being conducted.

INSTRUCTION AND DEMONSTRATION.

The herd is used for University student instructional work, cow demonstrations, judging by the parish club members and agents, and State Agricultural high schools, and judging butter-fat testing by the students of the College of Agriculture.

CROPS.

The crops of last session consisted of corn and soy beans for silage, corn and velvet beans, oats, root crops, and lespedeza for pasture and hay. Very favorable results for both pasture and hay have been gotten by sowing lespedeza in oats, grazing the oats and lespedeza until July 15, and then allowing it to grow until September, for hay.

Owing to the intention of moving the herd to the new College farm, no crops other than hay were planted.

During the Farmers' Short Course in January, 1923, a Jersey show was held, in which the Experiment Station animals were very conspicuous for their excellence.

NORTH LOUISIANA EXPERIMENT STATION

CALHOUN

Sidney Stewart, Superintendent.

The work at this Station for the past year was practically the same as has been carried on for the past several years, with addition of the demonstration work in cotton, corn and peas, and corn and velvet beans, on three separate areas in the "Lee" fields, situated in the southeastern part of the Station property.

A "Model Farm Orchard" was put out on a plot of two acres, northeast of the Superintendent's residence. This is a demonstration and an experiment in line with the efforts of the Experiment Station and Extension department in getting an orchard on as many farms as possible.

A flock of purebred S. C. Rhode Island Red poultry was bought in March from the Owens Farms, Vineyard Haven, Mass. Two poultry yards and a house to accommodate one hundred hens were built according to plans furnished by the Extension department. A "Buckeye" incubator and a brooder were also bought. The results thus far, have been unsatisfactory. A number of the birds died from various causes, and the remaining ones are comparatively inactive and slothful.

The demonstration work in the Lee field is on the ground which has been used for silage and necessitated growing the silage crops in the "Old Peach Orchard" field. The soil is too poor to produce profitable crops and has consequently been fallowed for the past three years. Owing to the late start in all the work of the Station. and the silage being left until most of the other crops were in, only about thirty tons of a poor grade of silage were produced. The excessive rainfall in the spring and summer retarded the work through the planting and cultivating seasons.

Calcium arsenate was used on the cotton fields, with very satisfactory results in controlling the boll weevil.

In the experiments and general crops grown on the Station during the year, 367 bushels of corn (besides what was grazed by the hogs and fed from the field), 13,681 pounds of cotton, 188 bushels of sweet potatoes, and about 14 tons of hay, were produced and harvested. A fairly good crop of velvet beans and cowpeas was grown.

Most of the buildings have been put in good repair, some of them having been taken down and rebuilt, using galvanized iron for the new roofs. An addition to the Superintendent's residence has been built and a fifty-six battery Delco electric light plant installed. All of the buildings on the grounds are furnished with lights.

The regular monthly agricultural meetings were held during the year. The second fair, since being discontinued in 1917, was held three days during October. A creditable display of agricultural products and livestock was made.

THREE YEAR ROTATION EXPERIMENT.

In this experiment, one-third of the area is planted to cotton, one-third to corn and peas, and one-third to oats, followed by peas. During the period between 1889 and 1908, the east half of each plot received an application of compost, at the rate of 30 bushels per acre. This compost is made up of green cotton seed, stable manure, and acid phosphate. Since 1908 the applications of compost have been made to the south half of each plot; therefore, one-fourth of each plot has received compost annually since 1889; one-fourth has received compost since 1908; one-fourth had received compost until 1908; and one-fourth has had no compost.

The results for 1922 on these plots are as follows:

	SE¼	SW¼	NE¼	NW¼
	¼ of plot fertilized with compost annually since 1889.	¼ of plot fertilized with compost annually since 1908.	¼ of plot composted until 1908.	¼ of plot with no compost since 1889.
Plot A Cotton.	1689.8 lbs. seed cotton per acre.	975.4 lbs. seed cotton per acre.	1174.2 lbs. seed cotton per acre.	684 lbs. seed cotton per acre.
Plot B Corn	22.33 bushels per acre.	20.37 bushels per acre.	15.11 bushels per acre.	12.48 bushels per acre.
Plot C Oats	2.23 tons hay per acre.	1.48 tons per acre	1.98 tons.	1.21 tons hay per acre.
Peas	2.10 tons hay per acre.	1.60 tons per acre	2.01 tons.	1.04 tons hay per acre.

MANURE ROTATION EXPERIMENT.

	Plot 1	Plot 2		Plot 3
	Corn Bu. per Acre	Oats Tons of hay per Acre	Peas	Cotton Lbs. per Acre
*Plat No. 1	21.20	2.36	5.88	780
“ “ 2	33.40	3.04	6.44	1040
“ “ 3	39.00	4.48	6.44	1640
* “ “ 4	24.60	2.08	5.00	1160
“ “ 5	34.60	2.78	4.72	1300
“ “ 6	36.80	2.84	5.28	1680
* “ “ 7	22.20	2.16	3.24	960
“ “ 8	29.40	2.24	4.64	1280
“ “ 9	37.20	3.12	4.84	1780
* “ “ 10	20.20	1.64	3.60	1100
“ “ 11	24.60	1.96	3.80	1260
“ “ 12	26.60	2.84	3.84	1660
* “ “ 13	24.80	2.10	4.40	1140
“ “ 14	21.40	2.44	4.60	1340
“ “ 15	26.60	2.96	5.28	1400
* “ “ 16	23.40	1.44	4.20	1040
“ “ 17	27.20	2.00	4.40	1300
“ “ 18	29.40	2.60	4.60	1560
* “ “ 19	17.20	1.84	3.20	1244

*Check Plats.

April 13. Planted corn.
October 23. Harvested.

November 27, 1921. Drilled in oats.
May 30, 1922. Harvested.

July 7. Planted peas.
September 9. Harvested.

May 6. Planted "Wanamaker's Improved Cleveland Big Boll" cotton.
September 6-7. Picked cotton.
October 17. Picked cotton.

EXPLANATION OF MANURE ROTATION PLOTS.

Corn and velvet beans, oats followed by cowpeas or soy beans, and cotton with oats and crimson or burr clover, at last cultivation. Oats and clover to be drilled between the rows of cotton.

Fertilizers

CORN

Plats 1, 4, 7, 10, 13, 16, and 19 are permanent checks, without manure.

Plat 2.—6 tons manure per acre, applied broadcast after plowing and then thoroughly disced into the soil.

Plat 3.—6 tons manure same as in No. 2 plus chemical fertilizer.
8 lbs. Nitrogen in cotton seed meal per acre.
8 lbs. Nitrogen in Nitrate of soda per acre.
16 lbs Phosphoric acid in A. Phosphate per acre.
4 lbs. Potash in Potassium sulphate per acre.

The Nitrogen and Acid phosphate to be total in material and the potash to be based on water soluble only.
The Nitrogen in Cotton seed meal and the P_2O_5 to be applied to the soil before planting. The N. in $NaNO_3$ to be applied as a top dressing.

Plat 5.—8 tons manure as in 2.
" 6.—8 tons manure as in 2 plus chemical fertilizers as in 3.
" 8.—10 tons manure as in 2.
" 9.—10 tons manure as in 2, plus chemical fertilizers as in 3.
" 11.—6 tons of manure per acre applied in the drill.
" 12.—6 tons manure per acre applied in the drill plus chemical fertilizer as in 3.
" 14.—8 tons manure per acre applied as in 11.
" 15.—8 tons manure per acre applied as in 11 plus chemical fertilizer as in 3.
" 17.—10 tons manure applied as in 11.
" 18.—10 tons manure per acre applied as in 11 plus chemical fertilizer as in 3.

Fertilizers

COTTON.

Plats 1, 4, 7, 10, 13, 16 and 19: Permanent checks without treatment.

Plats 2, 5, 8, 11, 14, and 17: Residual effect of manure previously applied to corn, in the rotations.

Plats 3, 6, 9, 12, 15, and 18: In addition to residual effect of manure previously applied to corn, 8 lbs. nitrogen in cotton seed meal per acre; 32 lbs. P_2O_5 in acid phosphate per acre; 8 lbs. water soluble potash in potassium sulphate per acre.

The above fertilizers to be mixed and applied from ten days to two weeks before a planting. Applications to be under the row of cotton.

OATS.

Plats 1, 4, 7, 10, 13, 16 and 19: Permanent checks without manurial treatment.

Plats 2, 5, 8, 11, 14, 17: Residual effect of manure previously applied to corn.

Plats 3, 6, 9, 12, 15, 18: In addition to residual effect of manure applied to corn, 8 lbs. of nitrogen $NaNO_3$ per acre, the nitrate of soda to be applied when the first signs of growth take place in the spring.

COWPEAS.

Plats 1, 4, 7, 10, 13, 16 and 19: Permanent checks without treatment.

Plats 2, 5, 8, 11, 14, 17: Residual effect of manure previously applied to corn.

Plats 3, 6, 9, 12, 15, 18: In addition to residual effect of manure previously applied to corn, 32 lbs. phosphoric acid in acid phosphate per acre, the acid phosphate to be applied in the drill before or at the time of planting the cowpeas.

COTTON VARIETY TESTS.

Variety.	Source of Seed.	No. Bolls per lb.	Lbs. per Acre	Lint %
1. Cleveland Big Boll	Dr. L. C. Allen, Hoschton, Ga.	65	1500	35.0
2. Delfas 6102	Miss. Delta Exp. Sta. Weilerman.	88	2040	29.6
3. Express 630	C. A. McLendon, Atlanta, Ga.	80	1440	31.2
4. Delta Type Webber 8985	Ped. Seed Co., Hartsville, S. C.	70	1140	27.1
5. Dixie Wilt Resistant 8554	Ped. Seed Co., Hartsville, S. C.	67	1200	29.5
6. Webber 49-4	Ped. Seed Co., Hartsville, S. C.	71	1170	30.0
7. Cleveland Big Boll	Piedmont Ped. Seed Co., Commerce, Ga.	60	1200	33.2
8. Tri-Cook	M. R. Hall, James, Ala.	66	1200	29.1
9. Dixie Triumph	L. O. Watson Seed Co., Florence, S. C.	60	1560	33.6
10. Webber 49-4	L. O. Watson Seed Co., Florence, S. C.	72	1170	30.0
11. Wanamaker-Cleveland B. B.	Model Seed Farm, St. Matthew, S. C.	57	1200	35.0
12. Cook 588	R. E. Hudson, Auburn, Ala.	56	1200	30.0
13. Meade	Artesia Farms Co., Albany, Ga.	88	990	30.0
14. Mexican Big Boll	Edgecomb Exp. Sta., Rockyport, N. C.	55	1380	31.0
15. Alexander Wilt. Res.	State Exp. Sta., Baton Rouge	79	1290	31.3
16. La. Hybrid No. 143	State Exp. Sta., Baton Rouge	80	1260	30.0
17. La. No. 1	State Exp. Sta., Baton Rouge	88	1260	29.0
18. Covington-Toole Wilt-Res.	W. F. Covington, Headland, Ala.	73	1380	29.1
19. Cook 588	Ala. Exp. Sta., Auburn, Ala.	60	1290	31.0
20. Cook 1346	Ala. Exp. Sta., Auburn, Ala.	70	1320	30.0
21. Cleveland 903	Ala. Exp. Sta., Auburn, Ala.	62	1200	31.0
22. Express 350	Holliman-White Co., Memphis, Tenn.	62	1530	31.3
23. Watson Wilt Resistant	L. O. Watson Seed Co., Florence, S. C.	70	1530	32.0

All of the above varieties were planted May 6, and picked September 7, 8, and 9. Lint percentages determined by Dr. Robert Glenk, Curator, State Museum, New Orleans, La.

In all variety tests one should not draw conclusions from results of one year. See previous reports for comparisons. It is seldom that any one variety gives the best results two years in succession.

Corn Variety Tests.

	Variety	Source of Seed.	Bu. per A.
1.	Ferguson's Pioneer	Ferguson Seed Farms, Sherman, Texas	35.72
2.	Whatley's Prolific	Whatley Bros., Helena, Ga.	31.71
3.	Ferguson's Yellow Dent	Ferguson Seed Farms, Sherman, Texas	32.23
4.	Ferguson's Surcropper	Ferguson Seed Farms, Sherman, Texas	31.71
5.	Ferguson's Chisholm	Ferguson Seed Farms, Sherman, Texas	27.50
6.	Stewart's Yellow Dent	Nat Stewart, Plain Dealing, La.	33.49
7.	Calhoun Red Cob	W. S. Powell, Stonewall, La.	30.76
8.	Allen's Big Ear Prolific	Dr. L. C. Allen, Hoschton, Ga.	37.01
9.	Imperial White Dent	Grant-Smith Co., Raceland, La.	28.24
10.	Hastings Prolific	J. D. Rawlinson, Gallion, La.	36.48
11.	Calhoun Red Cob	F. S. Veak, Tallulah, La.	32.59
12.	Rockdale	R. T. Douglas, Gilliam, La.	34.96
13.	Calhoun Red Cob	I. H. Haile, Linville, La.	34.96
14.	Calhoun Red Cob	J. R. Crumpton, Minden, La.	34.75
15.	Hastings Prolific	S. A. Meyers, Columbia, La.	33.75
16.	Mosby's Prolific	R. C. Webb, Delta, La.	34.23
17.	Mosby's Prolific	Miss. Delta Exp. Station, Weilerman, Miss.	39.74
18.	Cocke's Prolific	Miss. Delta Exp. Station, Weilerman, Miss.	34.49
19.	Calhoun Red Cob White Grain	State Experiment Station, Baton Rouge, La.	31.22
20.	Calhoun Red Cob, Yellow Grain	State Experiment Station, Baton Rouge, La.	29.50
21.	Calhoun Red Cob, White Grain	North La. Experiment Station, Calhoun, La.	33.02

April 10—Planted.

October 25—Harvested.

"PLACE EFFECT" COTTON VARIETY TESTS.

These experiments are carried on in cooperation with a number of state experiment stations, all of whom plant from the same lot of seed.

Variety	Source of Seed.	Lbs. per Acre	In old orchard [seed from last year's test
1. Coker's Delta Type Webber	Pedigreed Seed Co., Hartsville, S. C.	660	936
2. Express 433	Delta Experiment Station, Stoneville, Miss.	1020	1196
3. Cook 588	Ala. Experiment Station, Auburn, Ala.	900	962
4. Wanamaker Cleveland Big Boll	Model Seed Farm, St. Matthew, S. C.	960	1105
5. Trice	U. S. Dept. of Agriculture, Washington, D. C.	840	1092
6. Lone Star	U. S. Dept. of Agriculture, Washington, D. C.	810	1105
7. Acala	U. S. Dept. of Agriculture, Washington, D. C.	810	975

May 6—Planted Plot 10.

May 17—Planted Plot in orchard.

October 19—Picked both plots.

FORAGE CROP VARIETIES.

Plot 1. North of Barn.

Variety	Source of Seed	Percent Stand.	Weight Hay	Tons Per Acre
SOY BEANS:				
1. Biloxi	T. W. Wood & Sons, Richmond. Va.	100	38½	2.31
2. Biloxi	Chris Reuter, New Orleans, La.	100	31	1.86
3. Biloxi	H. G. Hastings, Atlanta, Ga.	100	27	1.62
4. Mammoth Yellow	T. W. Wood & Sons, Richmond, Va.	80	18¼	1.57
5. Mammoth Yellow	Chris Reuter, New Orleans	100	37	2.22
6. Mammoth Yellow	H. G. Hastings Co., Atlanta	100	28¾	1.72
7. Otootan	Chris Reuter, New Orleans	100	59	3.54
8. Otootan	H. G. Hastings, Atlanta, Ga.	100	47	2.82
9. Mongol	E. G. Lewis Seed Co., Media, Ill.	50	5	.60
10. Itosan	E. G. Lewis Seed Co., Media, Ill.	60	15	1.26
11. Ebony	E. G. Lewis Seed Co., Media, Ill.	80	22	1.58
12. Virginia	T. W. Wood & Sons, Richmond, Va.		18½	1.10
13. Tarheel Black	T. W. Wood & Sons, Richmond, Va.	90	21¾	1.43
14. Hollybrook	T. W. Wood & Sons, Richmond, Va.	75	20	1.50
15. Mammoth Yellow	T. W. Wood & Sons, Richmond, Va.	80	21¼	1.53
16. Barchet	North La. Exp. Station, Calhoun	10	3½	1.10

Seed planted June 22.

COWPEAS:		Wgt. Hay Lbs.	Tons per A.	Wgt. Seed Lbs.	Bu. per Acre
1. Groit	T. W. Wood & Sons, Richmond, Va.	40	2.40	5	6
2. Whippoorwill	T. W. Wood & Sons, Richmond, Va.	27	1.62	7	8.40
3. Brabham	T. W. Wood & Sons, Richmond, Va.	46	2.76	2	2.40
4. Taylor	T. W. Wood & Sons, Richmond, Va.	22	1.32	5	6.00
5. New Era	T. W. Wood & Sons, Richmond, Va.	14	.84	3½	4.20
6. Red Ripper	T. W. Wood & Sons, Richmond, Va.				
7. Clay	T. W. Wood & Sons, Richmond, Va.	29	1.74	2	2.40
8. Iron	T. W. Wood & Sons, Richmond, Va.	36	2.16	¾	.90
9. Cream Crowder	T. W. Wood & Sons, Richmond, Va.	20	1.20	2	2.40
10. Black	T. W. Wood & Sons, Richmond, Va.	25	1.50	2	2.40
11. Large White Black Eye	T. W. Wood & Sons, Richmond, Va.	Did not mature. Wilted			
12. "Purple Hull"	North La. Exp. Station, Calhoun	19	1.14	2½	3.00
13. White Crowder	North La. Exp. Station, Calhoun	Did not mature. Wilted			

Plot 2. North of Barn.

OATS.

Nov. 27, 1921—Drilled in oats. May 31, 1922—Harvested 1908 lbs. in straw, equal to 1.46 tons of hay per acre.

POTATOES.

July 1—Set out potato cuttings. November 2—Harvested 5,824 lbs. potatoes, 160 bushels.

Plot 3. North of Barn.

OATS.

Nov. 27, 1921—Drilled in oats. May 30, 1922—Grazed off by hogs.

POTATOES.

June 30—Set out potatoes. November 3—Harvested 5,440 lbs. potatoes, equal to 149.5 bushels per acre.

New Orchard. 2 Acres.

March 17—Set out "Model Farm Orchard." May 17—Planted cowpeas. July 29—Turned in hogs, 2,876 lbs. August 2—Weighed out hogs, 3,126 lbs. Gain, 250 lbs.

RESULTS OF COTTON DEMONSTRATION.

Area 2, North Lee Field.

12 ACRES.

	Man Hrs. Worked	Boy Hrs. Worked	Mule Hrs. Worked	
Discing, tractor and man				$5.47
Bedding land	25		25	
Fertilizer, (Phosphate $14.48, Nitrate of Soda $32.40)				$46.88
Applying Fertilizer (2 men, 22½ hrs. each)	45		45	
Other preparation before planting	45		45	
Seed, (32 bushels @ $1.00 per bu.)				$32.00
Planting	10½		10½	
Barring off	30		30	
Chopping	225	117½		
Dirting up	50		50	
Plowing out middles	35		35	
Sweeping up	45		45	
Plowing out middles	20		20	
Hoeing	145	65		
100 lbs. Calcium Arsenate				$14.00
Applying poison	20		10	
Picking 9,019 lbs. cotton at 75c per 100 lbs.				$67.64
Total	695½	182½	307	$166.19

Estimated ginning results, 3,006 lbs. lint; 6,012 lbs. seed.

RESULT OF CORN DEMONSTRATION.

Area No. 1, North Lee Field.

14 ACRES.

	Mule Hrs. Worked	Men Hrs. Worked	Boy Hrs. Worked	
Laying off rows	40	20		
Fertilizer (Acid Phosphate)				$20.64
Applying fertilizer		30		
Other preparation	104	89½		
Seed Corn				6.00
Planting	20	20		
Barring off	42½	42½		
Hoeing and Thinning		35		
Planting beans	30	30		
Cost of beans				7.00
Sweeping up corn	30	30		
Barring off beans	25	25		
Sweeping up beans	22½	22½		
Nitrate of Soda (1200 lbs. @ $7.20)				86.40
Laying by with turn plow	40	40		
Plowing out middle	30	30		
Harvesting	40	120		
Total	424	534½		$120.04

Corn harvested, 9,113 lbs., equal to 130.2 bushels.
Estimated yield of beans, 12,000 lbs.

South Lee Field

10¼ ACRES.

Preparation of soil for planting	65	50		
Tractor and Man				$ 2.60
Acid phosphate, (1500 lbs.)				12.90
Seed Corn				4.00
Barring off and other cultivation	75	85	30	
Nitrate of Soda (600 lbs. @ $7.12)				42.72
Harvesting	20	40		
Total	160	175	30	$64.22

Harvested 5,640 lbs. corn, equal to 80.57 bushels. Peas amounted to very little.

STATION NO. 4

RICE EXPERIMENT STATION

CROWLEY, LA.

Conducted in cooperation with the Bureau of Plant Industry, United Sates Department of Agriculture.

J. Mitchell Jenkins,

Superintendent of the Station, and Assistant Agronomist, Office of Cereal Investigations, Bureau of Plant Industry.

It is gratifying to be able to report that the year 1922 stands out as the most satisfactory of the fourteen years we have been pursuing certain lines of investigation at this Station. Results obtained have strengthened past indications, and placed those in charge in a better position to be of service to the rice industry. Not only have the results on the Station been gratifying, but the general interest in the work of the Station, by those connected with rice, in various ways, was emphasized as never before in its history. This was clearly shown in the letters received, callers entertained, and character of information desired.

The only change made in the lines of investigation, as reported last year, was to discontinue, for the present, the irrigation experiment. This was done in order that certain weeds that had accumulated in these plats might be killed, and thus permit more satisfactory results in the future.

The average temperature for the growing season was practically the same as that of last year. The maximum temperature for the year was one hundred one degrees F. This is the fourth time one hundred or above has been recorded since 1910, and the first time since 1918. The precipitation was much greater during the growing season, and in fact for the entire year; a rainfall of 69.89 inches having been recorded. This is the heaviest annual precipitation that has been noted in the thirteen years we have been keeping the records. While the annual rainfall was great, it did not interfere to any extent with field operations. The month of April was relatively dry, and while the precipitation for May was heavy, it was rather evenly distributed, and seldom heavy enough to interfere, for long periods at a time, with preparation and seeding.

The Bureau of Entomology discontinued, in July, the services of their representative. This was rather unfortunate in that investigations that had been commenced had to be suspended until some future date. It is the understanding that this work will be taken up again during the coming year. Damage from insects, especially the stem borer, is becoming greater each year, and it seems only fitting that we should have some one devoting his entire time to this phase of investigation.

No work along pathological lines was done this year, for the reason that no one was detailed for this project, by either the State or National authorities. The importance of investigations along this line is suggested by the preliminary reports issued by the several pathologists that have been stationed here at short intervals from time to time. The latest report issued by the Office of Cereal Investigations, United States Department of Agriculture, and dealing with seedling blight and stack-burn of rice, based on work begun at this Station, indicates the necessity of further investigations along this line, to say nothing of the many other diseases, especially Piricularia oryzae which attacks all varieties to greater or less degree, and of which little is known as to its transmittal or control. As far back as 1913, the writer forwarded diseased rice seedlings to Washington, and called attention to the large number of acres of early rice that had to be reseeded on account of this condition. At intervals since that time, this disease has been given attention, but not until this year has there been sufficient data accumulated upon which to issue a publication.

The demand for seed of rice varieties distributed by this Station has greatly increased, and the only reason, apparently, for not having a much greater acreage in some of them, is the fact that there is little clean land available for producing high class seed. In the past, the farmer has given entirely too little attention to the matter of seed rice. Since the beginning of this Station, this subject has been given especial attention, and at all times, farmers have been advised and encouraged to make special provision along this line, still every year one desiring good seed has to search, sometimes, the entire belt before he finds it, if ever. In 1921, there was evidence of a desire for bettering this condition, and in 1922 the matter took definite form. There was a time when few farmers thought of securing seed before spring; this year, the search was begun long before seeding time, and in fact, the fall before. There are several farmers and firms setting out to specialize in various varieties of seed rice, and it is to be hoped that within the next few years, the Station will be able to direct purchasers to parties having good seed, and not have to inform them that we know of no one having good seed, as we have been forced to do, especially during the past two years. One particularly encouraging thing in this whole matter is that many farmers refuse to buy seed unless it is absolutely free of weed seed, especially red rice.

During the past year, there was a growing interest in the soy bean, on the part of rice farmers. The results secured on the Station for the past six years, have gone a long way towards convincing the rice grower of the possibilities of their becoming a profitable crop from the standpoint of returns from the bean, as well as its advantageous effect upon the soil. The seed of the Biloxi variety grown on the Station was readily disposed of in this section. Several farmers have a small acreage, and one company seeded two hundred and sixty acres. The results secured by them were not as good as those obtained on the Station; however, this was no fault of the bean, but due to lack of experience in handling the crop. We are having frequent calls for information regarding bean seed, and bean harvesting machinery. The entire crop of eighty bushels of Biloxi seed produced this year on the Station has already been disposed of. Local men are now looking elsewhere for seed of this variety. There is little doubt but that in the course of a few more years the greater part of the rice lands that now lie idle each year will be seeded to the soy bean, and when this comes to pass, soy bean oil mills will be built throughout the rice belt. The oil cake from these mills will furnish an excellent substitute for some of the other materials that are now purchased for use in manufacturing mixed feeds.

The rice farmers seem to lack, in large measure, that deep interest and pride in their farms that they ought to have, and until this is developed in them to the extent of exerting every energy to have the cleanest land, produce the heaviest yields, and sell the highest quality rice, this section of Louisiana will never take the high stand as a farming community that it is capable of attaining.

A department bulletin is now in the government press in Washington, and will be issued early in 1923. This publication deals with seven new varieties of rice that have been developed at this Station, giving their behavior over a long period of years, as compared with several long established varieties.

EQUIPMENT.

The Station equipment was in no way increased during the past year. It is especially desirous that a small rat proof building be erected to be used exclusively as a store-house for seed. This is important, considering that at present the laboratory building has to be used for this purpose. This, while being inconvenient and unattractive, is damaging to the building.

Another improvement that would make operations on the Station more convenient, efficient, and in the end economical, would be to connect our deep well and buildings with the city electric plant. The Crowley equipment has been enlarged, and in every way improved, and is now sufficiently powerful to furnish much current in addition to that needed within its limits. The present motive power used in operating the deep well for irrigation purposes requires the attention of one man all the time that it is in operation, and if anything happens, and this is often, four or five men are required, sometimes the greater part of a day. The high price of gasoline, which is used as fuel, is also quite an item of expense. Electrical equipment would require practically no attention after set in motion.

FOREIGN VISITORS.

Foreigners continue to call on us for information pertaining to rice, both by letter and in person. During the year, we had one visitor from each of the following countries: Africa, Belgium, Siam, India, and the Philippine Islands.

THE FRUIT AND TRUCK EXPERIMENT STATION

HAMMOND, LA.

B. Szymoniak, Horticulturist in Charge.

The Fruit and Truck Experiment Station farm donated by Tangipahoa parish to the Louisiana State University, for experimental purposes, as more fully set forth in the report for 1921, was taken in charge on February 1, 1922.

As the buildings and fences were in bad repair it was necessary to spend a considerable amount of money in rebuilding the fences, repairing and painting the house, cleaning accumulated rubbish from fence rows to prevent losses of poles from fire, and in removing stumps etc., so as to put the ground in good condition before beginning experimental work.

Approximately three thousand stumps were removed from the cultivated area, two thousand feet of new fencing put in and the remaining portion of the fences rebuilt on straight lines and some new land was included in the fenced area.

A topographic survey of the entire farm was made by C. E. Moore, Civil Engineer of Tangipahoa parish, and a soil survey of the entire farm was made by A. F. Kidder, Agronomist of the Experiment Station, Baton Rouge. Soil samples in all areas were taken and are being analyzed in the chemical laboratory at Baton Rouge. All of this data will be assembled and put in proper form for permanent records as rapidly as opportunity will permit.

An artesian well with a four inch pipe was sunk to a depth of 365 feet, which is giving a flow of thirty-five gallons per minute of exceptionally fine water. A storage tank will be constructed for providing a reserve supply of water for irrigation of any portion of the farm that may be put under irrigation experiments in the future.

An up-to-date Delco light plant and water pump has been installed and water connection established for the kitchen and bath of the residence.

A poultry yard has been built for demonstration of a farm flock and a foundation flock has been purchased.

One acre of land has been planted to fruit trees in accordance with the plans of the "Home Orchard Campaign" of the Experiment Station and the Extension Division of the University, and also home garden plantings have been made in accordance with plans for home gardens throughout the State.

STRAWBERRY FERTILIZER EXPERIMENTS.

Fertilizer experiments were planned in accordance with what is known as the triangular method of testing amount of ingredients and most desirable combination of nitrogen, phosphoric acid and potash for strawberries. Four and eight-tenths acres are devoted to these experiments, including typical applications of 1-2-3 ingredients named above, in different amounts and different ratios. The plantings were made during November and the crop will be harvested in the spring of 1923.

COMPARATIVE MERITS OF STRAWBERRY PLANTINGS FROM DIFFERENT REGIONS OF THE UNITED STATES.

A comparison is being made of the vigor of growth and productiveness of strawberry plants secured from North Carolina and Arkansas, where the nursery production of strawberry plants is most highly developed, with the home grown plants. Several thousand plants are included in each plot for this comparison and all are now growing nicely, with the present indication that the Louisiana grown plants are of superior merit.

VARIETY TESTS.

In the strawberry variety tests, comparisons are being made of ten of the most promising strawberry varieties. Plantings were made in November and the crop will be harvested in the spring of 1923.

MUSCADINE GRAPES.

It is planned to give considerable attention to the possibility of developing the muscadine grape for the cut-over pine lands of Louisiana. This work is carried on in cooperation with the United States Department of Agriculture. One acre will be devoted to the collection of different varieties of muscadines; two acres will be devoted to the Thomas variety, for experiments in methods of pruning and training, and one acre to the Luolo variety for the same purpose. One-fourth of an acre will be devoted to the James variety, one-fourth to Memory, one-fourth to Flowers, one-fourth to Mish and one-fourth to Scuppernongs with the view of testing the relative merits of these varieties.

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BLACKBERRIES.

Two acres have been planted to MacDonald interplanted with Lucretia dewberries for pollination. The luxuriant growth of wild berries in this region would indicate that commercial developments are possible for this fruit.

PECAN TREES.

In cooperation with the Pecan Specialist of the United States Department of Agriculture, we have put out ten trees each of five standard varieties of pecans for experimental work in fertilizer and variety demonstrations.

ROTATION EXPERIMENTS.

One three-year rotation experiment and two two-year rotation experiments have been established with the view of determining the most effective and economical means of maintaining the nitrogen supply of the soil to lessen the disastrous results of protracted dry weather on the one hand or excessive rainfall on the other. Cowpeas, soy beans and velvet beans are the legumes used on these rotations.

CHANGES IN STAFF.

G. D. Cain, Assistant Director in charge of the North Louisiana Experiment Station at Calhoun, resigned January 1, 1922, to go into Extension work as County Agent. Sidney Stewart was appointed Superintendent of the Calhourn Station, to succeed Mr. Cain.

Boleslaus Szymoniak, Pecan Specialist of the Extension Division, was appointed Horticulturist in charge of the Fruit and Truck Station, at Hammond, La., February 1, 1922.

W. G. Raines, Assistant Research Chemist at the Sugar Experiment Station, New Orleans, resigned December, 1922, to accept a position with a large sugar company in the tropics.

A. D. Lipscomb, Assistant Chemist in the Fertilizer and Feed Stuffs Laboratory, resigned September, 1922, to go into the retail drug business at Auburn, Ala.

A. A. Ormsby, Specialist in Fair Exhibits, resigned April 1, 1922, to accept the position of Secretary-Manager of the Florida Parishes Fair, at Hammond, La.

L. B. Eastland, appointed to succeed Mr. Ormsby, resigned January 1, 1923, to go into the life insurance business in Baton Rouge.

Mrs. Helen Hardy, Mailing Secretary, resigned October 1, 1922.

Pierre Hernandez was appointed Assistant Agronomist, July 1, 1922.

Compton R. Hummel, Assistant Chemist in the Fertilizer and Feed Stuffs Laboratory, is now in Charge of Experiment Station Records.

PUBLICATIONS.

Annual Report for 1921.

INVENTORY OF EXPERIMENT STATION PROPERTY

During the past year we have more completely systematized our records pertaining to the property and equipment of the Experiment Stations, and have assigned Mr. Compton R. Hummel to the work of keeping an inventory that will show, at the end of each quarter, the property and equipment that has been added, as well as that which has been disposed of. Of course we have a great deal of property in the way of materials and specimens used in experimental work that has great value from a scientific viewpoint but no commercial value.

The figures given below pertain wholly to commerical values.

	Livestock	Tools and Implements	Apparatus	Chemicals
Non-Expendable Property	....	$12,798.63	$22,240.94	....
Expendable Property	$23,407.00	104.89	2,381.36	$ 1,534.27
Total	$23,407.00	$12,903.52	$24,622.30	$ 1,534.27

	Furniture Fixtures	Miscell'n's	Total
Non-Expendable Property	$ 5,160.86	$ 3,154.21	$43,354.64
Expendable Property	3.60	1,179.47	28,610.59
Total	$ 5,164.46	$ 4,338.68	$71,965.23

Note—These figures do not include any of the libraries.

Automobiles and trucks are included in "Miscellaneous Non-Expendable."

Stationery and office supplies included in "Miscellaneous Expendable."

Inventory includes property of the Experiment Station Dairy up to **June 9, 1923.**

FINANCIAL STATEMENT

	Hatch Fund	Adams Fund
Dr.		
Receipts from the Treasurer of the United States, as per appropriations for the fiscal year ended June 30, 1922, under Acts of Congress aproved March 2, 1887 (Hatch Fund) and March 16, 1906, (Adams Fund)	$15,000.00	$15,000.00
Cr.		
Salaries	$ 9,056.81	$10,999.94
Labor	2,964.18	575.00
Publications	325.52	....
Postage and Stationery	164.44	47.70
Freight and Express	56.83	66.52
Heat, Light and Water	445.69	286.49
Chemical Supplies	....	707.51
Seeds and Sundries	224.59	157.35
Fertilizers	10.00	5.12
Feeding Stuffs	403.05	61.40
Library	93.65	172.01
Tools, Implements and Machinery	122.31	....
Furniture and Fixtures	232.70	168.51
Scientific Apparatus	....	1,508.70
Livestock	....	....
Traveling Expense	562.35	179.85
Contingent Expense	75.56	....
Building and Repairs	272.32	63.90
Total	$15,000.00	$15,000.00

STATE FUND.

Receipts and Expenditures from January 1, 1922, to December 31, 1922, Inclusive.

RECEIPTS.

State Appropriation	$45,000.00	
Refunds	4,688.09	
Interest on Daily Balance	178.54	
Sales of Farm Products	6,076.44	
Loan from Evangeline Bank & Trust Co.	10,000.00	
Total Receipts	$65,943.07	
Balance on Hand January 1, 1922	5,822.50	
Total (Balance and Receipts)	$71,765.57	
Overdraft December 31, 1922	1,329.14	
Total Receipts and Overdraft		$73,094.71

EXPENDITURES.

Salaries	$26,238.21	
Labor	14,795.80	
Publications	334.66	
Postage and Stationery	690.99	
Freight and Express	893.34	
Heat, Light and Water	642.86	
Chemical Supplies	35.84	
Seed and Sundries	2,503.80	
Fertilizer	687.58	
Feed Stuffs	1,136.84	
Library	78.16	
Tools, Implements and Machinery	3,512.57	
Furniture and Fixtures	1,702.60	
Scientific Apparatus	1,086.07	
Livestock	998.21	
Traveling Expenses	2,139.17	
Repayment of Loan to Evangeline Bank & Trust Company	7,000.00	
Contingent Expenses	3,616.24	
Building and Repairs	5,001.77	
Total Expenditures		$73,094.71

FERTILIZER AND FEED STUFFS FUND.

Receipts and Expenditures from January 1, 1922, to December 31, 1922, inclusive.

RECEIPTS.

Commissioner of Agriculture	$24,720.75	
Refunds	79.50	
Total Receipts	$24,800.25	
Balance on Hand January 1, 1922	6,748.32	
Total (Balance and Receipts)		$31,548.57

EXPENDITURES.

Salaries	$16,860.74	
Labor	1,881.80	
Postage and Stationery	391.70	
Freight and Express	122.37	
Heat, Light and Water	687.95	
Chemical Supplies	3,089.63	
Seeds and Sundries	229.13	
Fertilizer	.... ..	
Library	33.60	
Tools, Implements and Machinery	118.05	
Furniture and Fixtures	670.21	
Scientific Apparatus	2,758.37	
Traveling Expenses	219.21	
Contingent Expenses	139.50	
Building and Repairs	1,315.70	
Total Expenditures	$28,517.96	
Balance on Hand, December 31, 1922	3,030.61	
Total Expenditures and Balance		$31,548.57

EXPERIMENT STATION DAIRY FUND.

RECEIPTS.

Sale of Milk	$ 5,191.16	
Sale of Livestock	1,835.20	
Miscellaneous Sales	48.60	
Total Receipts	$ 7,074.96	
Balance on Hand January 1, 1922	374.03	
Total (Receipts and Balance)		$7,448.99

EXPENDITURES.

Labor	$ 2,880.02	
Seeds and Sundries	1,262.59	
Feed Stuffs	2,444.52	
Tools, Implements and Machinery	48.59	
Livestock	700.00	
Building and Repairs	96.92	
Total	$ 7,432.64	
Balance on Hand December 31, 1922	16.35	
Total Expenditures and Balance		$ 7,448.99

THIRTY-FIFTH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

FOR

1923

TO THE GOVERNOR

BY

W. R. DODSON, DIRECTOR

Ramires-Jones Printing Co.
Baton Rouge
1924

EXPERIMENT STATION STAFF

W. R. DODSON, A. B., B. S., Director.

W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterinarian.

W. G. TAGGART, B. S., Ass't Director, Sugar Station, New Orleans.

A. F. KIDDER, B. S., Agronomist and Ass't Director, Baton Rouge.

SIDNEY STEWART, Superintendent, North Louisiana Station, Calhoun.

J. MITCHELL JENKINS, B. S., Superintendent, Rice Experiment Station, Crowley.

B. SZYMONIAK, B. S., Horticulturist, Fruit and Truck Station, Hammond.

C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.

HARRY MORRIS, D. V. M., Bacteriologist and Ass't Veterinarian, Baton Rouge.

W. G. BRADLEY, Assistant Entomologist, Baton Rouge.

G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.

J. F. BREWSTER, Ph. D., Research Chemist, Sugar Station, New Orleans.

WM. L. OWEN, B. S., Bacteriologist, Sugar Station, New Orleans.

A. P. KERR, M. S., Chief Chemist, Fertilizer and Feed Stuffs Laboratory, Baton Rouge.

W. P. DENSON, B. S., Ass't Chemist, Baton Rouge.

J. H. JOLLY, B. S., Ass't Chemist, Baton Rouge.

J. L. FARR, M. S., Ass't Chemist, Baton Rouge.

COMPTON R. HUMMEL, B. S., In Charge of Records, Baton Rouge.

R. P. SWIRE, Treasurer, Baton Rouge.

MRS. RUTH HEIDELBERG, Secretary, Baton Rouge.

J. K. McHUGH, Librarian, Baton Rouge.

E. K. BREEDEN, Farm Manager, State Station Farm, Baton Rouge.

C. C. MORELAND, B. S., Ass't Plant Pathologist, Baton Rouge.

ALVERTA WRIGHT, Stenographer, Rice Station, Crowley.

College of Agriculture,
AGRICULTURAL EXPERIMENT STATIONS

Baton Rouge, February 1, 1924.

To His Excellency, John M. Parker,
Governor of Louisiana,
Baton Rouge, La.

My dear Sir:

I have the honor to transmit herewith, a report of the work, receipts and expenditures of the Agricultural Experiemnt Stations for the year 1923, this being the thirty-fifth annual report since the passage of the first Federal act, known as the Hatch Act, making provision for Federal aid for the establishment of agricultural experiment stations in the several states.

This report covers all the important work at the five experiment stations, and the financial statement of all funds from all sources administered through the Experiment Station office and for which the Director of Experiment Stations is responsible.

The vouchers and accounts have been regularly examined each six months by the Supervisor of Public Accounts and reports have been made to you as to the results of each examination. You will recall that the Supervisor has reported, ''All payments were carefully examined and same found to be supported by good and satisfactory vouchers''.

Copies of this report will be sent to the United States Department of Agriculture, at Washington, D. C., and to other experiment stations, as required for the report of the Hatch and Adams funds, and a sufficient number will be printed to enable us to supply all interested parties, including the members of the Legislature, public boards, libraries, and leading agriculturists.

I am,

Respectfully,
W. R. Dodson,
Director.

GENERAL STATEMENT.

The reports of the heads of the several divisions of the Experiment Station work are intended to cover the results of 1923 only, unless otherwise indicated. Where specific data of results of crop yields, etc., are given, it is for the purpose of giving full information on the work for the one year, as a matter of record, and conclusions should not be drawn from this data alone. Bulletins are published as results accumulate to a degree that seems to justify special reports, giving full discussion and suggested conclusions that seem to be justified.

The season has been less favorable than normal for all field work at all the stations.

There have been no important changes in the policies of the Station work, or in the Staff, except that toward the close of the year it was deemed necessary to drop some of the projects so as to enable us to give better financial support to others. After thorough consideration it was decided that we could eliminate some of the work in Agronomy, at the Baton Rouge Station, with the least loss to the general work. Since it is contemplated that most of the field plot work will be transferred to the new University grounds during the year 1924, continuation of the records of the old plots was less important than if the work were to be continued on the old plots. The basis of conducting the work will be somewhat changed also, when we move to the new site of the University.

The field work of the Sugar Experiment Station was brought to a close in December, and the experiments transferred to the new College farm at Baton Rouge, where approximately one hundred acres have been allotted to the Sugar Experiment Station. A new sugar house will be constructed adjacent to the University power house and equipment for both experimental and instructional work will be provided. If the plans now approved by the building Committee are carried out, we will have within the next two years, thoroughly modern facilities for research work in all of the technical phases of sugar manufacture.

The year has been an important one for the Fruit and Truck Station at Hammond. When the Station farm was accepted two years ago, the plans for the Hammond-Covington highway brought the road alongside the Experiment farm. However, during the year, a new survey was made, leaving the Experiment Station a half mile to one side of the road. The interest of the State Highway Commission and a number of progressive citizens of Hammond, in having the Experiment Station on a public highway was, no doubt, an important factor in securing governmental approval of a new route for the road, more favorable to the Experiment Station than even the first survey. The road is now nearing completion, running through the full length of the east side of the Experiment Station property.

The year 1923 should also mark an epoch in the work at the Rice Experiment Station. This Station has been quietly working on some fundamental problems for a number of years, accumulating data upon which to make some positive recommendations regarding some of the fundamental problems of the rice industry of the prairie sections.

In September, 1923, at a public meeting of a few of the outstanding rice farmers, canal men and bankers, and representatives of the Extension Department of the University and U. S. Department of Agriculture, a program of farm practice was unanimously approved, as an ideal, for adoption in the prairie section. A specialist in rice culture has been added to the Extension Department of the University, to spend his entire time in the rice parishes, helping to secure the adoption of the general principles of this program by as many farmers as possible. The work is making good progress.

The Director of the Experiment Stations has given more than the usual amount of time to duties of Dean of the College of Agriculture. As a member of the Building Committee of the new University and of the Executive Body of that Committee, it has been necessary to give a large amount of time to that work.

Of the work done by the Director outside of the State, in an effort to advance the interests of agriculture, the following may be mentioned: (1) He helped to plan and execute as Chairman of a Committee of nine, a study of boll weevil control experiments, by state and federal agencies in the states east of the Mississippi River and at Tallulah, La., during 1923; (2) He served as Chairman of the Cotton Council of the Association of Southern Agricultural Workers. It is the function of this Council, composed of twelve members, to study and correlate all the research work on cotton production being carried on by the state experiment stations and the United States Department of Agriculure; (3) At the request of the American Bankers Association, he has served as a member of a Committee of three, in an advisory capacity, to the Agricultural Commission of the American Bankers Association, attending two meetings at their expense; (4) Has served as Chairman of a Special Committee of four, from the Association of Land Grant Colleges, on the Purnell Bill. This Bill, now before the Federal Congress, provides for increased financial support of the experiment stations by the Federal Government; (5) Has written articles for the Banker-Farmer, The Bankers Monthly, for the Agricultural Press, and has delivered a number of addresses on agricultural topics.

STATION NO. 1.

Sugar Experiment Station, Audubon Park, New Orleans.

W. G. TAGGART, Ass't Director, in Charge.

Including Field Work, Chemistry, and Bacteriology.

SUGAR CANE WORK.

The close of the year 1923 marked the end of field operations at the Sugar Experiment Station, in Audubon Park. This Station, which was established at Kenner in 1885 by some farseeing men, the Louisiana Sugar Planters, was moved to Audubon Park in 1890. There it has remained, serving not only the industry in Louisiana but influencing the sugar-growing world; it is now being moved to the Greater Agricultural College farm at Baton Rouge, where better facilities for its expansion and development will be provided.

Yields of sugar cane for the past year were extremely low throughout the belt, and this Station fared no better than did the planters. Extremely heavy rainfall during the spring and summer months, and an unusually large infestation of cane borers cut down our crop severely. However, we still got some experimental data that from a comparative standpoint, are worthy of notice.

Melilotus indica, planted on fall plant cane, again made good growth; in fact, produced more nitrogen per acre (107 pounds) than last. It was decided to give this clover a severe test, and a very stiff, poorly drained plot was used for it. The growth of clover was satisfactory but the benefit was not reflected to so marked an extent as has been recorded in the past. The best drained side of the plot which was used as a check, made more than the area in clover, but again the area in clover made more cane than a third section of equal level, which was also a check.

The benefit to the stubble crop after clover had been turned under on the preceding plant crop was very apparent, and, in fact, was in line with the amount of clover turned under. One and eight-tenths tons more cane were secured from lands where clover had been turned under on the twentieth of March, 1922, and only eight-tenths of a ton on lands where the clover was turned under eighteen days earlier.

Data on the use of a double ration of phosphoric acid as against a single ration were contradictory. One experiment yielded in favor of a single ration and the other, in favor of a double ration.

On account of the disorganization due to the contemplated transfer of the experiments to Baton Rouge, only a part of the nitrogenous materials test could be carried on. This test showed that nitrate of soda gave the best results, ammonium nitrate ranking second; and these were followed by ammonium sulphate and calcium cyanamid, the last two showing but very little difference. It is valuable, as well as interesting, to note that the two most soluble nitrogenous materials gave highest results in an exceedingly wet year.

The work of securing a strain of cane immunized to the mosaic disease was continued here by our Pathologist, with good results. His conclusions will be found under Plant Pathology.

Over twelve hundred varieties of seedlings that continue to prove worth while were transferred to the new fields at Baton Rouge. To this collection we will add three thousand more that have been collected by the United States Department of Agriculture and which are now growing in quarantine, and will be liberated to us in the early spring. We hope to soon have quantities of the best canes for distribution, and with more ground at our disposal we will be able to get these out to the planters in a more satisfactory manner.

This office has been called on for more than the usual number of letters from without the State and from foreign countries. Particularly is this true in regard to information on mosaic disease and the use of sweet clover.

The sixteenth annual Field Day of the Louisiana Sugar Planters Association, held at the Station in July, was well attended. The attention of visiting planters was particularly called to our work in seed selection and to sweet clover on fall plant cane.

ENTOMOLOGICAL WORK.

T. E. Holloway, In Charge U. S. Entomological Laboratory.

Cooperation with the United States Bureau of Entomology in the investigation of sugar cane insects has been continued. During the year an experiment was undertaken to render the egg parasite of the sugar cane borer more efficient, but this was unsuccessful. However, other experiments have been started in keeping the parasite over winter, with the intention of releasing it early in the spring.

The tachinid parasite, introduced from Cuba is still active, and was found at sixteen plantations. It is spreading over the sugar parishes, though it has not yet caused any reduction in the damage by the cane borer.

For the second year a parasite received from the European Cane Borer Laboratory of the Bureau, which had introduced it from France, was reared with the cane borer as host. Many adults of this parasite have been released at two plantation properties, but no trace of them has since been found.

Various chemicals were tried in an effort to attract the moths of the borer, but the results were negative in every case.

At the request of the Assistant Director, an experiment in dipping cane in water heated below 50° C. was performed, to determine the effect on the sugar cane mealybug. It was found that temperatures lower than 50 degrees were not effective in destroying the mealybug. The soaking of seed cane in water heated to 50 degrees for twenty minutes is therefore correct against both the borer and the mealybug, and the cane is not harmed unless the eyes are soft and ready to sprout, as in cane after it has been removed from the windrow in the spring.

Various field observations were made, not only in Louisiana but also in Georgia, Mississippi and Texas, and experiments on the control of the mealybug were carried on in Georgia. Examinations of sugar cane for insect injury were also made along the west coast of Mexico and Lower California. A new tachinid parasite and a moth borer not previously reported from Mexico, were found.

CHEMICAL RESEARCH DEPARTMENT

J. F. BREWSTER, Ph. D.

Investigational laboratory work of this department during the past year was devoted to the following subjects:

COLORING MATTER OF THE CANE RIND.

This is a continuation of previous work upon this subject which has been somewhat slow and tedious. However, the results appear to warrant the efforts spent since it has led to an investigation of all the plant pigments occurring in cane and their relation to the sugar industry. All varieties of cane examined contain in the outer skin, chlorophyll, xanthophyll and carotin. The first, green, the latter two, yellow pigments. Besides these two potential coloring matters, saccharetin and tannin (cane polyphenols) also occur. Purple and other dark colored cane varieties contain, in addition to the above, a sixth pigment which imparts to them their purple, black or reddish color. This has long been considered as being an anthocyan. Our researches have shown that this pigment must belong in some other chemical group, or if it is an anthocyan, it possesses properties very different from those previously isolated and described. This being true, the identification of the pigment will form an important contribution to plant chemistry. The above matter formed the subject of a report read at the September 1923 meeting of the Sugar Division of the American Chemical Society. A study of some of the reactions of these pigments and their effect upon cane products, has accompanied the above investigation and is to be completed.

COLORING MATTERS FORMED BY ACTION OF ALKALI UPON REDUCING SUGARS.

The Chemical Research department was fortunate for several weeks in having the voluntary assistance of Mr. H. H. Dodds who, working with the writer, accomplished a large amount of work upon this subject. Although considerable information was at hand in regard to the action of alkali upon the reducing sugars always present in cane juice and its effect upon the yield of sugar, etc., this is the first time the problem has been attacked from the standpoint of amounts of color formed and conditions of its formation. Spectrophotometric examination of the color indicates that it is a nearly pure yellow. This research fits in with the other work of the Station upon coloring matters of cane products.

REACTION OF SUGAR HOUSE LIQUORS AS RELATED TO CLARIFICATION AND COLOR.

This is a continuation of sugar house and laboratory investigations upon the practical side of clarification which, obviously, is to be considered a major project for chemical investigation by this Station and to which other chemical researches are more or less contributory, since the object is to discover best methods of juice treatment to yield commercial products of highest attainable quality, of maximum purity and at lowest cost. The last annual report contained a reference to a process being studied here, in which the usual procedure of sulfitation for white sugar manufacture was reversed, the juice being first clarified with lime, as in the manufacture of raw sugar, the clear juice or syrup is then lightly sulfured to attain a bleaching out of coloring matters. Good white sugar and molasses are obtainable, but the process must be very carefully controlled to provide highest yields. A much better elimination of impurities, particularly of lime salts, is attained than by the ordinary sulfitation process; much less sulfur is required in the treatment, hence the sulfur content of the molasses is very much reduced. With a much lower content of lime salts, particularly of calcium sulfite, a decreased deposition of scale upon the heating surfaces is to be expected. The hydrogen ion method for the control of reaction in the chemical treatment of sugar liquors, which for the first time, in the cane industry, was employed here, has been used in all our clarification studies and is proving to be one of our most valuable tools. The hydrogen ion methods as developed here, have been used by others in sugar work during the past year, both in Louisiana and the Tropics and have been very favorably reported on.

COLLABORATIVE WORK WITH THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS.

The honor of appointment as Associate Referee on Sugar House Products of the Association of Official Agricultural Chemists has been conferred upon the incumbent of the position of Research Chemist of this Station in times past, and the custom is being continued. No mention of this connection has been made previously by the present writer in his annual reports but the work connected therewith has been carried on. Two reports upon collaborative work in the analysis of sugar, sirup and molasses have been furnished from this Station in the past two years. The first was upon ash determination, the second upon determination of total solids. The duties devolving upon the Associate Referee are to compile the analytical methods to be tried, prepare and forward samples, collect and compile the results and report thereon at the annual meeting of the Association. In this way, analytical methods are subjected to thorough trial at the hands of many analysts and conclusions may be drawn as to the merits or demerits of the methods. This work is of great importance to all sugar chemists, for analysis plays an important part in their work. The duties of Associate Referee have not been permitted to consume a great deal of the Research Chemist's time, but the work is considered well worth while for keeping him in touch with analytical methods and enabling him to choose the most reliable of these when necessary to his investigational work.

The project of total solid determination is being continued this year.

BACTERIOLOGICAL RESEARCH DEPARTMENT.

WM. L. OWEN.

The work of this department during the past year has followed the general plan outlined in the previous report. The investigation of Sugar Deterioration in Storage has been continued as the main project of the department and has received most attention. Among the new phases of the problem that have been studied during the period embraced by this report, are the following:

THE PROTECTIVE INOCULATION OF SUGARS FOR THE PREVENTION OF THEIR DETERIORATION IN STORAGE.

One of the most promising measures for the prevention of sugar deterioration in storage seems, at the present time, to consist in the impregnation of sugars with certain races of torulae, or non-sporulating yeasts. Our investigations have shown that the mold fungi occurring in sugars and causing their deterioration are very susceptible to the action of carbon dioxide. Advantage is thus taken of the ability of the torulae in the molasses films of sugars and to produce carbon dioxide thereby preventing the molds from developing. The additional advantages of this means of protecting sugars from deterioration are: (1) That the destruction of the reducing sugars by the torulae causes an increase in the polarization of the sugar during storage; (2) The elimination of reducing, especially levulose, makes the sugar less hygroscopic, and hence less susceptible to moisture absorption, and the deterioration resulting therefrom. This phase of the problem of the prevention of sugar deterioration has been actively investigated during the past year. An extensive series of experiments were conducted to determine the following factors: (1) The relative activity, as regards carbon dioxide formation, of the various races of torulae occurring in sugars; (2) The influence of various media upon this activity, and the medium best suited for their propagation; (3) The number of torulae necessary for the protection of sugars of varying factors of safety. Experiments have also been carried out with the view of determining the most suitable methods for inoculating sugars, and extensive studies have been made of the effects of such inoculations upon laboratory made sugars. Considerable attention has been given to devising an adequate method for the determination of CO^2 content of sugars, with the view of using such data in connection with the "Factor of Safety" as an additional criterion of the ultimate behavior of sugars in storage.

A preliminary report on this phase of the problem of sugar deterioration was published in "Sugar" during the early part of last year.

A STUDY OF THE EFFECT OF REINOCULATION WITH MOLD FUNGI UPON THE DETERIORATION OF CUBAN RAW SUGARS.

During the past year a comprehensive study of Cuban raws was made for the purpose of determining the following facts regarding their behavior in storage: (1) The percentage of samples conforming to the "Factor of Safety"; (2) The degree of their infection with mold fungi and torulae; (3) The result of reinoculating them with very active mold cultures, with and without an accompanying inoculation with torulae; (4) The results of the reabsorption of moisture upon the deterioration of the inoculated and uninoculated samples. Through the courtesy of Mr. Warren Crane, Superintendent of the local branch of the American Sugar Refinery, a sample was furnished of each of the fifty-three cargoes of sugars obtained from Cuba during the year. Each of these was studied as above described, with the exception that the reinoculation with torulae was abandoned during the early part of the investigation and the amount of sample was found to be inadequate for the study of the effect of moisture absorption upon the rate of deterioration of the sample during storage. All of these data have not been compiled as yet, but will be prepared for publication during the early part of the present year. The results show that the condition of infection of sugars, quantitatively and qualitatively considered, has a very marked influence upon their keeping quality. The observation of the rate of deterioration of the samples as affected by inoculation with torulae, demonstrated that this method is ineffective when applied to sugars which contain their original molasses film. This is to be expected since it is impracticable to adequately impregnate the molasses film with sufficient torulae to develop enough CO^2 for the prompt suppression of mold growth in the original film.

MOISTURE ABSORPTION OF SUGARS AS INFLUENCED BY PHYSICAL AND CHEMICAL CHARACTERISTICS OF COMPOSITION.

In our previous report was given some of the results from the investigation of the moisture absorption of Cuban raws of various sizes of grain. During the past year a similar study was made of fifteen samples of plantation granulated obtained from the various factories in the State making this grade of sugar. Comparisons of the rate of moisture absorption of these samples and refined standard granulated, showed that many of them were actually superior to the refined sugar in this respect. The tests were made under varying conditions of humidity and temperatures. It was concluded from these studies that one of the most potent factors contributing toward the hygroscopic nature of white sugars is the presence of fine grain and sugar dust. The results of this investigation were published in the Louisiana Planter during the past year.

A STUDY OF THE ACTION OF VARIOUS VEGETABLE CARBONS IN THE REMOVAL OF MICROORGANISMS FROM JUICES AND SIRUPS IN THE PROCESS OF CANE SUGAR AND SIRUP MANUFACTURE.

This investigation was begun during the latter part of the 1922 grinding season and was continued during the present one. Norit, Darco, and Suchar were tested and also Filter-Cel. A series of experiments have been carried out with these substances and their quantitative and qualitative action upon the bacterial flora of juices observed. Although a very large percentage of microorganisms were removed from cane juices by filtration with small amounts of these filtering media, their efficiency in this respect does not seem to be very closely correlated with their removal of organic impurities. Filtration with carbons changes the predominant types of microorganisms in juices, and retards the rate of the development of those remaining. While the rate of development of microorganisms in juices treated with carbons is slower than in the unfiltered juice, the difference is not as great as one might expect considering the amount of nutritive material removed. This is explainable by the changes in the predominant types of nutritive material removed, and the resulting change in the food demanded for a continued normal rate of increase. The mere straining of juices through cotton greatly reduces the number of microorganisms contained in them, owing to the removal of trash and mechanically suspended impurities. The effect of the addition of formaldehyde upon raw and carbon treated juices was studied with the view of dedetermining the amounts of these substances required to preserve the two types. Observations on the rate of development of microorganisms in juices stored at high and low temperature and the effect of this development upon the composition of the juice failed to show any detectable changes in composition within three hours. This seems somewhat at variance with reports in the industry of losses from bacteriological causes in the sucrose content of the juices during normal operation of milling. However, since the time required for detectable changes in composition to take place depends entirely upon the number and kinds of organisms present, an excessive degree of infection resulting from very dirty cane, or the presence of excessive amounts of trash might account for the deterioration of juice during milling.

THE EFFECT OF VARYING ADDITIONS OF ACID UPON THE YIELDS OF ALCOHOL FROM CANE MOLASSES.

The above investigation was carried out by Mr. J. D. Bond, a graduate student of the University, who spent two months in this laboratory. The results were prepared for publication during the past year and submitted to and accepted for publication by the Journal of Industrial and Engineering Chemistry. The results showed that the acid requirements of molasses for distillery purposes vary with the type of yeast employed for its fermentation, and that insufficient additions of acid depressed the yields of alcohol by all the yeast cultures tested. The acid requirement of Louisiana molasses was more variable for the different yeast cultures than was that of the Cuban. It was concluded from this investigation that the degree of acidification of molasses for efficient fermentation has to be very carefully controlled if maximum results are to be obtained.

STATION NO. 2.

BATON ROUGE, LA.

Including the Departments of (1) Agronomy; (2) Animal Pathology; (3) Entomology; (4) Horticulture; (5) Plant Pathology; (6) Chemistry and Fertilizer and Feed Stuffs Laboratory.

AGRONOMY.

A. F. KIDDER, Agronomist,

HUGO STONEBERG, Assistant Agronomist, Detailed by Office of Cereal Investigations, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.

E. K. BREEDEN, Farm Manager,

PIERRE HERNANDEZ, Assistant Agronomist (Resigned June 1, 1923.

The year was one of adverse weather conditions. There were one hundred and forty days without rain, one hundred and twenty-six cloudy and threatening days, and ninety-nine rainy days, or practically sixty-two percent of the year was cloudy or rainy. It was necessary to do a great deal of extra work as such a large amount had to be done over two or three times. Birds were particularly destructive, especially in the spring, and much time was devoted to guarding the plats.

SOIL FERTILITY.

The two year rotation and the permanent cropping plats were discontinued in 1922 by authorization of the Director of the Experiment Stations. The corn plats receiving acid phosphate and cotton seed meal at different periods of growth, were continued. These plats had to be replanted four times because of bud worms and birds and even then the stand on the one receiving organic matter was poor. The difference in yield was not as large as usual for continued rains seemed to benefit the plat that did not have organic matter added.

Four different carriers of nitrogen when applied to cotton and corn were compared. There was a small difference in yield of cotton treated with calcium nitrate, nitrate of soda and ammonium sulphate. Cotton seed meal treatment was considerably lower than the others. The corn plats were abandoned because of bud worms and adverse weather conditions.

This was the third season of growing alfalfa treated with lime, lime and acid phosphate and lime and raw rock phosphate. The lime and phosphate treatment for the three year period has been profitable on the Bluff soils.

CROP PRODUCTION.

The variety tests of corn, cotton, oats, soy beans and sugar beets have been continued. The leading varieties of cotton are Cleveland Big Boll, Trice, Mexican Big Boll, Alex Wilt Resistant, Dixie Triumph and Wannamaker-Cleveland and are recommended for the Bluff soils. Express and Delfos 6102 are the highest yielding long staple varieties.

The prolific corns produced the highest yields when the largest number of stalks are taken into consideration. The difference between the prolific and the one-ear types is small when a smaller number of stalks per acre are planted.

The Patterson oat has continued to give the highest yield among the oat varieties.

Four plantings of soy bean varieties were made at intervals of two weeks, beginning on the 10th of May. The earliest planting produced the highest yield in both seed and hay. Biloxi and Mammoth Yellow are recommended for seed. The Ebony matures seed much earlier and is a good variety for hogging down with early corn. Otootan, Barchet, Laredo and Virginia are the varieties to use for hay production.

The sugar beet varieties were planted at different times but the stand was poor in all but the first planting and it was the only one saved. The yield was from 25 % to 40% lower, while the sucrose content was about the same. The beets grown in cooperation with a number of sugar planters on the alluvial lands produced larger yields than those grown at the Station, but the sucrose content was a number of points lower.

The varieties of velvet beans show that the Osceola was the highest yielding for this season. Tracy's Early Black matured the earliest but the yield was low.

The Red clover seed from foreign countries supplied by A. J. Pieters, Forage Crop Investigations, Bureau of Plant Industry, produced plants that were only slightly affected with mildew. All plats sown with Red clover seed grown in the United States were badly affected with mildew. Red Clover gave the highest yield of all clovers.

Corn ought to be planted as early as possible. The early planting not only produced more corn per acre, but insect damage was considerably lower. This project is in cooperation with the Station Entomologist.

The project on different methods of corn cultivation had to be abandoned because of weather conditions.

This is the third year of the cooperative "Place Effect" cotton project. All data from the different cooperators has not been assembled so it is impossible to draw any conclusions as to shipping cotton seed from one section of the Cotton Belt to another.

PLANT BREEDING.

The seed from one hundred and twenty individual cotton plant sections were planted. A large number of blooms on the individual plants were bagged to insure self-pollination, in order to eliminate the deleterious characters. Some very good plants will be available for the planting of 1924.

Several individual selections of oat plants made in 1919 are still worthy of further work. A larger number of the selections made in 1921 are still in the nursery. No selections from the field were made in 1923, as the oat crop was practically a failure owing to excessive rain.

The corn breeding work in cooperation with the Station Plant Pathologist has been continued. The data for three years is being worked over at the present time and no definite conclusions can be drawn now. With the other corn work, the yellow color as been established in the Yellow Calhoun and some seed is on hand.

Corn breeding in cooperation with the Office of Corn Investigations, Cereal Investigations, Bureau of Plant Industry, was begun this year. Results are practically the same as those obtained by this Office at Arlington Farm, Washington, D. C., and Florence, South Carolina. The ears loosely covered with shuck showed heavy damage by weevils. Also those ears attacked by the ear worm and borer in the field, were damaged by the weevil when the corn was stored in the shuck. Mr. Hugo Stoneberg, Office of Corn Investigations, spent the past year at the Station in charge of this work.

ANIMAL PATHOLOGY.

HARRY MORRIS

The work in the Department of Animal Pathology for 1923 was in continuation of the same projects as reported previously.

ANTHRAX.

The study of the blood-sucking insects as disseminators of anthrax has been continued during the past year. During the summer of 1922 anthrax was transmitted from Guinea pigs to other experimental animals by several species of Tabanus. Some flies produced a very high percentage of infections. It was thought advisable to duplicate this work during another season, to confirm these results. Practically the same results were obtained as in 1922. Fifty percent infections were produced by one specie of Tabanus fulvulus Wd. This fly proved to be a ferocious feeder either upon the horse or experimental animals. Other flies of this species produced lower percentages of infections.

Transmission tests were carried on with several of the larger species of Tabanus with negative results. These flies would not feed upon an experimental animal while in captivity. This has been the experience of a great many workers.

All flies were collected in the fields and woods and identified by Mr. W. G. Bradley, of the Department of Entomology.

The usual number of specimens were examined at the laboratory during the past year but very few cases of anthrax were found.

By the continued use of anthrax vaccine and observing, as far as possible, the common rules of sanitation, the Station passed the twelfth year without a case of anthrax among the livestock. During the year all the dairy cattle were moved to the new

College farm, where the disease was rather common several years ago.

INFECTIOUS ABORTION.

The infectious abortion work has proved that it is possible to keep the disease under control while working under adverse conditions. Sanitary measures have been followed, as far as possible, and a normal calf crop has been produced, notwithstanding the fact that a great number of the dairy cows are carriers of infection.

The Department has conducted the usual large correspondence with stock owners throughout the State, concerning animal diseases and allied subjects. The Head of the Department has contributed many articles to the press on the subject of livestock sanitation.

DIRECTOR'S NOTE: The work of class room instruction has encroached upon the time of Dr. Morris to an extent that renders necessary a readjustment of the salary apportioned to the Experiment Station and the University, respectively. Such adjustment is planned at the close of the regular session of the University.

DEPARTMENT OF ENTOMOLOGY.

THOS. H. JONES, Entomologist in Charge. (Resigned, effective December 31, 1923).

W. G. BRADLEY, Assistant.

The projects of this Department have been similar in nature to those conducted in 1922, being confined for the most part, to insects injurious to corn, and insects injurious to live stock. Somewhat more attention has been given to the corn ear worm and the sugar cane moth than in previous years, while insects injurious to stored corn received no attention.

Considerable time has been given to building up the collection and procuring photographs of the more economic species in order to facilitate identification of material sent in to the laboratory.

INSECTS INJURIOUS TO CORN.

Southern Corn Root Worm, Diabrotica duodecimpunctata 01.

In cooperation with the Agronomist, Mr. A. F. Kidder, of the State Station, Baton Rouge, ten plantings of corn were made in a field that was plowed on February 22, 1923. Rows for each planting were prepared when the planting was made. Plantings were made on March 10th and 17th; April 7th, 21st, and 28th; May 5th, 12th, 23d, and 28th; and June 2nd. The stalks from each planting were examined when small for root worm damage. Root worms were found injuring the stalks of the first four plantings only, injury being most severe to the plantings of March 10th and April 7th. In these two plantings only about five percent of the stalks showed injury when examined, the infestation not being severe.

In a field experiment with paradichlorobenzene, corn kernels failed to germinate when one or more grams of the material was placed with the seed, and the material interfered with germination to a lesser extent when placed at distances of 3 and 6 inches from the seed. When paradichlorobenzene was applied at like distances from young corn stalks, less damage was apparent than when it was placed with the seed. Root worms were found injuring corn in hills when the substance had been placed 12 inches distant.

The finding of root worms in numbers at the roots of volunteer oats at Baton Rouge during the spring of 1923 is of interest and suggests that injury to corn may be caused by larvae that are present at the roots of grasses when the land is prepared for planting the corn. Other observations indicate that larvae that injure young corn come from eggs that are deposited before the corn is planted and that corn planted in land that has previously had a growth of grass on it, is more apt to be injured.

The Corn Earworm, Heliothis obsoleta Fab.

The ears on the stalks of the plantings of corn mentioned above under Diabrotica duodecimpunctata were examined to ascertain what percentage were injured by the earworm, examinations being made as nearly as possible when the ears were in the "roasting ear" stage. The results of these examinations are given in the following table.

It will be noted that the ears of the last four plantings were the most heavily infested and that there was a marked increase in infestation between the plantings of May 5th and May 12th. Naturally, all plantings being made in the same field, the early plantings could have served as a breeding place from which moths might develop to lay their eggs on corn of later plantings.

Table Showing Results of Examination Made to Ascertain Percentage of Corn Ears Injured by the Earworm in Succession of Plantings Made in Same Field at Baton Rouge.

Corn Planted	Ears Examined	Days between planting and examination	Ears without earworms	Ears with earworms or showing evidence of their work	Percentage of ears with earworms or showing evidence of their work.
March 10	July 5	117	8	30	79
March 17	July 10	115	20	18	47
April 7	July 23	107	28	42	60
April 21	July 27	97	22	49	69
April 28	July 31	94	34	44	56
May 5	Aug. 3	90	23	23	50
May 12	Aug. 10	90	0	81	100
May 23	Aug. 20	89	0	63	100
May 28	Aug. 25	89	0	82	100
June 2	Aug. 27	86	1	62	98

THE SUGAR CANE MOTH BORER, DIATRAEA SACCHARALIS FAB.

At the time when the ears of corn above referred to were examined for the presence of earworms, the stalks were split open and the entire plant examined with the idea of ascertaining whether the borer had injured it. The results are given in the following table. Injury to the stalk, tassel, shank of the ear, and ear, were observed. It will be noted that the later plantings showed a greater percentage of plants injured and that the percentage of plants injured in the planting of May 5 was comparatively low. Again, as in the case of the earworm, it should be remembered that the large number of injured plants in the later plantings might have been due to the early plantings in the same field.

Table showing results of examinations made to ascertain percentage of plants injured by the sugar cane moth borer in succession of plantings made in same field at Baton Rouge.

Corn Planted	Plants Examined	Plants Without Borers	Plants With Borers or showing evidence of Their Work	Pecentage of Plants With Borers or Showing Evidence of Their Work
March 10	July 5	34	7	17
March 17	July 10	25	21	45
April 7	July 23	23	59	72
April 21	July 27	29	61	68
April 28	July 31	36	56	61
May 5	Aug. 3	47	25	35
May 12	Aug. 10	34	55	62
May 23	Aug. 20	19	57	75
May 28	Aug. 25	1	86	98
June 2	Aug. 27	2	81	97

During the year some attention has been given to the question of wild grasses as possible food plants of the borer. Larvae have been found feeding in the stems of the following grasses, more especially during the fall and winter months: Panicum barbinode, Panicum gymnocarpon, Panicum dichotomivorum, Paspalum larranagae, Holcus halepensis, Andropogon glomeratus, and volunteer rice.

Observations indicate that the question of wild grasses is important in relation to injury to corn in sections where these grasses are abundant, the moths probably flying from the grasses to the corn, in the spring.

INSECTS INJURIOUS TO LIVE STOCK

Horseflies and Deerflies, Tabanidae.

The work on Tabanidae during the year was along the same lines as those carried on since the project was started on July

1, 1920. It consisted principally in making observations on the immature stages and adults under field conditions and in rearing through the adult stage, larvae collected in the field. The greater part of this work has been done in the vicinity of Baton Rouge, but some has been done elsewhere in the State, particularly in the vicinity of Mound and Cameron. To date we have collected forty-six species (thirty-five of Tabanus, ten of Chrysops and one of Diachlorus) and adults of nineteen species (fifteen of Tabanus and four of Chrysops), represented by one hundred and fifty individual specimens, have been reared from larvae taken in the field. A paper giving the summary of observations made from July 1, 1920 to the end of 1922 appeared in the June 1923 number of the Journal of Economic Entomology, (Vol. 16, Pages 307 to 312) and another paper, summarizing the work done during 1923, was prepared for publication in the same Journal.

Some attention has been given to the subject of repellant mixtures to be used as sprays against insects attacking live stock. The following substances were emulsified with water, using fish-oil soap as the emulsifying agent: Pine tar, yellow pine oil, red pine oil, white pine oil, and crude oil. The mixture made from pine tar was more efficient than those made from the pine oils and the crude oils but it did not keep the flies off completely and did not kill them.

Scale Insects, Coccidae.

As time permitted, attention has been given to the scale insects of the State, with the idea of ultimately preparing an illustrated paper having to do with the various species taken, the plants which they attack, their distribution, their natural enemies, and methods advised for the control of those species which are of economic importance. A considerable percentage of letters of inquiry received by the Experiment Station, concerning insects have to do with scale insects and with the information that has accumulated since this work was begun it is now possible to answer these inquiries more satisfactorily than previously. To date we have specimens of sixty-nine species that have been taken in the State.

DEPARTMENT OF HORTICULTURE.

G. L. TIEBOUT, Horticulturist (Part time).

Introductory: Since the establishment of the Fruit and Truck Experiment Station at Hammond, arrangement was made for the discontinuance of most of the horticultural work at Baton Rouge. The leader here was to divide his time between Experiment Station and Extension work, devoting most of his attention to Extension activities.

IRISH POTATO SEED IMPROVEMENT WORK.

The past season's activities terminated our cooperative agreement with the Bureau of Plant Industry, U. S. Department of Agriculture, and results have been extremely satisfactory. The tests over a period of years have conclusively demonstrated that certified seed of the Triumph variety originating primarily in Nebraska and Wisconsin is decidedly superior to uncertified or common seed offered through regular trade channels, such uncertified seed usually being purchased from local dealers at the potato producing centers in Louisiana.

SUMMARY—4 YEARS. AVERAGE.

Source of Seed (Certified.)	Total Number of Lots	Yield, Bus. per Acre, Merchantable.	Increase over Uncertified	Increase in Percentage	Mosaic Percent
Nebraska	18	144.6	45.1 Bu.	45.3	7.9
Wisconsin	16	139.8	40.3 Bu.	40.5	23.9
Minnesota	6	120.7	21.2 Bu.	21.3	33.5
Checks uncertified	17	99.5			47.5

In 1923 the tests included thirty lots of Triumph potatoes, twenty-seven of which were certified seed from Nebraska, Montana, Wisconsin and North Dakota, and three lots were northern-grown uncertified stock from local dealers.

The certified seed gave over sixty-one percent more yield than the uncertified and there was about seven times more mosaic disease in the uncertified than in the certified. This disease appears to be the greatest limiting factor in successful Triumph production in the State, and most lots of certified seed, especially those from Nebraska, contain a low percentage of this disease.

Eight lots of Montana certified Triumph potato seed were tried for the first time. On the average they were found to contain very little mosaic disease.

TEST WORK WITH NEBRASKA CERTIFIED TRIUMPH SEED POTATOES.

The favorable results over a period of several years with the Nebraska certified Triumphs in comparison with those from other states, caused us to seek the best among the certified. Accordingly, an arrangement was made whereby over one hundred lots of Nebraska certified Triumph seed were tested at the Station. Professor H. O. Werner, in charge of the potato seed certification work in Nebraska, visited the tests during the growing periods for the purpose of noting vine diseases, particularly mosaic. At digging, yields were recorded so that Professor Werner could eliminate any lot for use as foundation stock in western Nebraska.

MISCELLANEOUS ACTIVITIES.

The improvement of the Creole onion by selection, the cold storage versus ordinary storage of various garden seed, the testing of a few annual flowers, and other routine or miscellaneous work has continued in a restricted way.

NOTABLE APPLICATIONS.

The test work with certified Triumph seed potatoes and the extension activities incident thereto, have saved the Triumph potato industry for Louisiana. Commercial Triumph production in this State was being abandoned generally, because of low yields due primarily to poor seed. These activities showed the superiority of certified seed over common stock, indicated probable sources, and brought potato specialists to this State to help study the problems. As a result in 1923, about forty carloads of certified Triumph seed were planted in Louisiana, and about as many more were bought by a dealer of this State for planting in Texas. Most of this certified stock came from the State of Nebraska, and the results were very satisfactory, so much so, that one hundred to one hundred and fifty cars will likely be bought from the same section for planting during the coming season.

DEPARTMENT OF PLANT PATHOLOGY.

C. W. EDGERTON, Pathologist,
C. C. MORELAND, Assistant Pathologist.

During 1923 the projects were the same as those of the preceding year. The work, however, was confined largely to a few definite projects. Some attention was given to the plant disease survey and to some other important problems that developed during the year. The ones receiving most attention were those on sugar cane diseases, corn root rots, and tomato wilt.

SUGAR CANE DISEASES.

The investigations of this Department on the sugar cane were largely confined to mosaic diseases. This disease is a serious factor in sugar production and will doubtless continue to be until satisfactory methods of control are available.

The most satisfactory method of controlling the mosaic, yet suggested, seems to be by the use of resistant or tolerant varieties. There are a number of resistant or tolerant varieties for other cane growing countries but none of them are very satisfactory under Louisiana conditions. An attempt is now being made to obtain resistant strains from some of our established commercial varieties. This is being done by selecting canes from a badly infected field that show the least injurious effect from the disease, and using these for seed. These selections are tried out the following year and then the best hills from the plots are again selected for the next year. This work has been carried on for four years at Audubon Park. Each year the selections have shown less injury from the mosaic and the tonnage has been considerably higher. This work has been carried on for a number of years with the D 74 and Purple varieties, and for a shorter period with some of the other varieties. In 1923, the selected Purple strain produced 19.7 tons to the acre, while the unselected produced 18.5 tons; the selected D 74 produced 11.9 tons while the unselected produced only 8.85 tons. These selected strains were removed to Baton Rouge at planting time and the work will be continued there.

The red rot disease was also severe during 1923 and observations were continued on this trouble. The red rot was responsible for the low sucrose content of the cane in many localities.

CORN ROOT ROT.

The corn root rot project is being carried on in cooperation with the Station Agronomist. The work has been in progress during four seasons. The object is to determine if the presence of the so-called root rot organisms in the corn grains has any effect on the germination and yield of corn. Data have been obtained on the fungus content of one hundred to two hundred ears of corn each season, the germination of this corn in the laboratory and field, the stand obtained and the yield. These data are at present being compiled and it is hoped that the results will be ready for publication during the coming year. The expected correlation between fungus infection and low yields has not been obtained nor have the germination tests given a satisfactory indication of the yield.

TOMATO WILT.

The tomato wilt project was confined to the growing of stock seed of our resistant tomato varieties, the testing out of seed of these varieties grown in other localities and the effect of commercial copper compounds in the soil on the development of the wilt disease. These varieties are consistently giving good results under our conditions and it is necessary to keep them going until the seed can become available through the seed trade. Copper compounds applied to the soil seemed to have no effect in controlling the wilt disease.

PLANT DISEASE SURVEY.

During the past year, the usual amount of time has been given to the Plant Disease Survey, in cooperation with the United States Department of Agriculture. If it were possible, this work should be extended as a knowledge of the distribution and severity of all of the Louisiana diseases is very important.

OTHER WORK.

During 1923 there were also some interesting disease outbreaks which called for preliminary invesigation. An outbreak of the blackfire of angular leaf spot of tobacco occurred in the St. James Perique tobacco district. This disease had obtained a start during the preceding year but spread during 1923 and caused considerable damage. This is one of the serious tobacco diseases and will become a factor in tobacco growing in Louisiana unless sanitary precautionary measures are taken to keep it under control. An Extension circular on the subject was published during the year, for the benefit of the tobacco growers.

Several complaints of injury to buildings by the dry rot disease caused by the fungus, Poria incrassata were received during the year. One of the buildings on the University Campus became affected and an opportunity was had to study the trouble. In this building, repairs were made under the direction of this Department and no more trouble is expected. This is a trouble which annually causes a heavy loss to buildings and building material in this State.

A blight of longleaf pine seedlings also developed during the season in those localities where reforestation projects are in progress. A trip was made to Bogalusa and the disease was studied in the field and later in the laboratory. The disease attacks the young leaves and causes them to die back nearly to the crown. The disease was so severe in July that the reforested areas looked brown and dead. With the development of reforestation, this disease is liable to become more and more important and should be studied in detail. The disease is not new but it only becomes important when reforestation is attempted.

DEPARTMENT OF CHEMISTRY, FERTILIZER AND FEED STUFFS LABORATORY.

A. P. KERR, Chief Chemist.
W. P. DENSON, Assistant Chemist,
JESSE L. FARR, Assistant Chemist,
J. H. JOLLY, Assistant Chemist.

The laboratory analyses of feed stuffs and fertilizers for the Department of Agriculture, for the year 1922-1923 were completed September 1, 1923, and published by the Commissioner of Agriculture. These analyses showed about the usual standard of feed stuffs and fertilizers on sale in the State as during previous year. A few new kinds of fertilizers, such as acidulated tankage and potassium phosphate came into market.

The laboratory has been advocating the use of a few standards of high grade fertilizers and some of the manufacturers have agreed to eliminate, as near as possible, a great many formulas that have been found on the market heretofore. If the purchaser will ask for the following mixtures the units of plant food can be obtained cheaper and he will also help to place high grade fertilizer only, on the market in the future.

% Available Phosphoric Acid	% Nitrogen (Not Ammonia)	% Potash
12	3	0
10	4	0
8	4	4
7	5	5
12	2	2
8	7	0
12	3	3
12	4	4
8	4	6
12	0	4
10	4	2

These figures are representative of the following fertilizer constituents: Available phosphoric acid, nitrogen (not ammonia) and potash. At any place in the formula where a zero is found, of course it means that none of this constituent is guaranteed. It may take some time to get these formulae before the consumers, yet it is a start in the right direction.

MISCELLANEOUS WORK.

Miscellaneous work consisted of analyses of soils, waters, fertilizers, feed stuffs, minerals, and materials supposed to have produced animal poisoning. The increase in the use of sodium nitrate as a source of nitrogen fertilizers has been accompanied by an increase in fatal cases of livestock poisoning. It is not very well known that nitrate of soda is injurious to live stock. Danger lies in the fact that live stock will lick it as they do common stock. Nitrate of soda has the general appearance of salt and ignorant persons sometimes give it to livestock by mistake, thinking they are giving common salt.

MICROSCOPY WORK.

The microscopy work on feed stuffs, which was started January 1923, is being continued. It seems to be the only way to have any accurate method of checking up the manufacturers in regard to naming the different materials that go into mixed feeds.

The soils of the plats of the Fruit and Truck Experiment Station at Hammond, have been completed. The total plant foods of these soils were determined, believing that this kind of analysis might be desirable for future reference.

There has been some question as to whether the free fatty acid in cotton seed oil is increased by sterilizing the seed with heat against the pink boll worm. The laboratory has been studying this problem by determining the free fatty acid in seed from the same ginning before and after sterilization; also seed from different sections of the State have been sterilized in the laboratory. While the work has not been carried to completion, our results so far do not indicate that the free fatty acids are increased by the amount of heat required by the regulations for sterilizing cotton seed to kill the pink boll work.

STATION NO. 3.

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN.

SIDNEY STEWART, Superintendent.

The work carried on at this Station the past year was practically the same as has been for the past few years. One project was discontinued: The Three Year Rotation with Manure, in one-twentieth acre plots. The amount of work involved in carrying on this project was not justifiable, from the results of the experiments. More attention was given to cotton than heretofore. Two different types of dusting machines were used for applying calcium arsenate against the boll weevil. The "Warlo" machine, purchased in 1922, was used on twelve acres, the balance being taken care of by a "Root Saddle Gun". While not as effective as a power machine, the saddle gun is very satisfactory where the larger machine could not be used. It does not break the poison into as small particles as the larger machine, nor does it discharge with enough force to get much benefit from the rebound, but in terraced and broken fields it is more easily handled, with less injury to the plants than a heavier outfit. A small amount of poison can be more evenly distributed than with the other type. A rigid schedule for poisoning was followed as closely as the weather conditions permitted, although some weevils were in the cotton at all times they were checked in their work considerably. The most apparent damage was done by boll worms, showing up a little later than the first weevils. The poisoning had very little effect in reducing the damage done by them, which was fully as heavy as that of the weevil. The damage done by the Army worm was light, except in the eastern part of Area No. 3, which was badly infested before a new supply of poison could be obtained. The yield was reduced considerably on that account.

No silage crop was planted this season, as the herd of cattle was small enough to be taken care of during the winter in grazing the fields. Forty-five head of cows and calves were shipped to the University last February, leaving sixteen head here. This number of cattle has been increased by four calves during the year.

The size of the Kudzu plot has been extended to include Plot 10 in the Experiment field. All of the northwest corner of the field will be sodded the coming season. Parts of the original plot were bedded out in broad beds, turning under all of the vegetable matter. In a very short time after the vines began making a growth very little difference could be told in what was turned under and what was not disturbed. Part of the plot will be planted in a cultivated crop the coming season, in an effort to devise some means of utilizing the fertility deposited in the soil by the plant.

There has been no substantial increase in the number of fowls in the poultry flock the past season, due to poor hatches of eggs kept too long and to diarrhoea in the baby chicks. The flock has improved in quality and some of the birds are fine individuals.

Due to the road construction it has been necessary to remove and reset all of the fence along the south side of the public road and most of the fence on the north side. Consequently, the fence is in good condition, as most of it was replaced with new fencing.

One of the tenant houses has been recovered entirely with new shingles and repaired throughout. The others have had some work done on them, putting them in fair condition. The Agricultural Building porch is screened and was used as an annex for exhibits during the fair. The roof was painted, as well as the roofs on the dining hall, horse stables, hog stalls, dipping vat, and manure shed. It will be necessary to recover the Agricultural Building and the Auditorium the coming year, as they are in such condition as to cause the buildings to be beyond repair in a short time.

A meeting of the North Louisiana Agricultural Society was held the last Thursday in each month, from March to August. The September meeting was not held on account of the nearness of the fair dates. The meetings were, as a rule, well attended and were of benefit to those attending.

THREE YEAR ROTATION EXPERIMENT.

Plots A, B, and C.

In this experiment one-third of the area is planted to cotton, one-third to corn and peas, and one-third to oats, followed by cowpeas. During the period between 1889 and 1908 the east half of each plot received an application of compost at the rate of thirty bushels per acre. This compost is made up of green cotton seed, stable manure and acid phosphate. Since 1908 the applications of compost have been made to the south half of each plot. Therefore, one-fourth of each plot has received compost annually since 1889; one-fourth of each plot has received compost since 1908; one-fourth received compost until 1908; and one-fourth has never received any compost. For the past few years the amount of compost used has been increased from thirty bushels per acre to forty bushels per acre.

Results for 1923 on these plots are as follows:

	SE¼ ¼ of plot fertilized with compost annually since 1889	SW¼ ¼ of plot fertilized with compost annually since 1908	NE¼ ¼ of plot fertilized with compost annually until 1908	NW¼ ¼ of plot that has received no compost since beginning of the experiment.
Plot A Corn	20.26 Bu. per A.	20.30 Bu. per A.	13.45 Bu. per A.	4.59 Bu. per A.
Plot B Oats	1279 Lbs. per A.	1110 Lbs. per A.	889 Lbs. per A.	889 Lbs. per A.
Cowpeas (Hay)	2226.31 Lbs. per A.	2184.21 Lbs. per A.	1673.68 Lbs. per A.	1178.94 Lbs. per A.
Plot C Cotton	817.10 Lbs. per A.	841.45 Lbs. per A.	641.45 Lbs. per A.	492.76 Lbs. per A.

COMPARISON OF TWO STRAINS OF CLEVELAND BIG BOLL AGAINST HALF AND HALF, LATE PLANTING.

The soil was broken during the winter with a two horse turn plow, to a depth of about seven inches.

May 7th: Disced with a Fordson tractor and disc harrow.

June 2nd: Disced second time. Laid off 3½ foot rows with 8 inch shovel on "Georgia" stock. 200 pounds of acid phosphate and 75 pounds of nitrate of soda per acre were applied in furrow by hand and bedded on with middle burster, which

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was followed by Gee Whiz, pulling down beds. One row each of home grown Wannamaker Cleveland Big Boll, Georgia grown, Wanamaker Cleveland Big Boll and Half and Half was planted and repeated several times across the plot in this order.

June 13: Side harrowed cotton.

June 25: Chopped, leaving in bunches of from 3 to 6 plants every 8 inches.

July 3: Ran Gee Whiz in middles and swept up with 5 inch shovel and 12 inch sweep.

July 5: Plowed out middles with 6″ shovel and 18″ sweep.

July 5: Applied Calcium arsenate, after .73 inch rain, with "Root Saddle Gun".

July 10: Calcium arsenate applied as above.

July 14: Calcium arsenate applied as above.

July 20: Calcium arsenate applied as above.

July 23: Swept up with 5″ shovel and 20″ sweep.

Aug. 7: Ran Gee Whiz (closed) in middles and followed with shovel and 20″ sweep, one furrow in middles.

Aug. 10: Dusted with Calcium arsenate, for Army worms.

Oct. 10: Harvested.

Rows, one acre in length were staked through the best part of the plot and each variety picked separately, resulting as follows;

Home grown seed produced at rate of 1254 lbs. per acre.

Georgia grown seed produced at rate of 1290 lbs. per acre.

Half and Half seed produced at rate of 1297 lbs. per acre.

Entire plot of 1.44 acres produced 1509 pounds; or 1048 pounds per acre.

Number of bolls per pound:

Home grown seed	59
Georgia grown seed	56
Half and Half	71

COMPARATIVE RESULTS.

COTTON VARIETY TESTS.

Listed in order of production.

	Variety	No. Bolls per Lb.	Yield per Acre	Lint %	Sources of Seed
1	Dixie Triumph	64	1410		L. O. Watson, Florence, South Carolina.
2	Salsbury	75	1380		Delta & Pine Land Co., Scott, Mississippi.
3	Lightning Express	77	1350		Pedigreed Seed Co., Hartsville, S. C.
4	Cleveland Big Boll	71	1345		Pedigreed Seed Co., Hartsville, S. C.
5	Express 350-630	70	1340		Miss. Delta Station, Weilman, Miss.
6	Cleveland Big Boll	63	1320		Dr. L. C. Allen, Hoschton, Ga.
7	Delfos 6102	76	1315		Mississippi Delta Station, Weilman, Miss.
8	Express 782	70	1295		Mississippi Delta Station, Weilman, Miss.
9	Coker Ped. Clev. No. 3	60	1290		Pedigreed Seed Co., Hartsville, S. C.
10	Express 350-630	73	1250		C. A. McLendon, Atlanta, Ga.
11	Cook 588	67	1230		R. E. Hudson, Auburn, Ala.
12	Cook 588	56	1220		Alabama Experiment Station, Auburn, Ala.
13	Delta Type Strain 2	71	1185		Pedigreed Seed Farm, St. Matthews, S. C.
14	Wannamaker Cleveland	64	1160		Model Seed Farm, St. Matthews, S. C.
15	Delfos 631	68	1130		Mississippi Delta Station, Weilman, Miss.
16	College No. 1	70	1115		State College of Agriculture, Athens, Georgia.
17	Bank Account	75	1080		H. G. Hastings, Atlanta, Ga.
18	La. Hybrid 143	77	1055		State Experiment Station, Baton Rouge, La.
19	Alex. Wilt Resistant	88	1020		State Experiment Station, Baton Rouge, La.
20	Covington-Toole WR	72	1015		W. F. Covington, Headland, Ala.
21	Express 350	77	965		Holliman-White Co., Memphis, Tenn.
22	Mexican Big Boll	57	940		N. C. Experiment Station, Raleigh, N. C.
23	Meade	70	925		Artesia Farms, Albany, Ga.
24	Webber 49—Strain 6	74	920		Pedigreed Seed Farm, Hartsville, S. C.
25	Louisiana No. 1	81	915		State Experiment Station, Baton Rouge, La.

This cotton was planted May 7th, fertilized with 200 lbs. acid phopshate and 50 lbs. sodium nitrate in beds ahead of planting; and 50 lbs. of sodium nitrate immediately following chopping and ahead of first sweeping. It was given four applications of calcium arsenate for boll weevils and one for Army worms, beginning July 5th. The balance was given July 10th, 14th, and 20th. The last, for worms, was applied August 10th. Harvested September 25th-27th.

"PLACE EFFECT" COTTON VARIETY TESTS.

These experiments are carried on in cooperation with a number of state experiment stations, all of whom plant from the same lot of seed.

Variety	No. Bolls per Lb.	Yield per Acre	Lint %	Source of Seed
1 Wannamaker Clev. B. B.	63	1140		Model Seed Farm, St. Matthew, S. C.
2 Coker Ped. Delta Type Webber	56	1077		Pedigreed Seed Co., Hartsville, S. C.
3 Express 433	68	685		Delta Experiment Station, Stoneville, Miss.
4 Trice	70	1000		Dept. of Agriculture, (BPI) Washington, D. C.
5 Acala	56	1055		Dept. of Agriculture, (BPI) Washington, D. C.
6 Lone Star	45	890		Dept. of Agriculture, (BPI) Washington, D. C.
7 Cook 588		1080		Ala. Experiment Station, Auburn, Ala.

This cotton was planted on the same date as the general varieties above and was given the same treatment throughout.

COMPARATIVE RESULTS,

CORN VARIETY TESTS.

Listed in order of production.

	Variety	Yield in Bu. per Acre	Source of Seed
1	Whatley's Prolific	52.07	Whatley Bros., Helena, Ga.
2	Hastings Prolific	50.03	S. A. Myers, Columbia La.
3	Neal's Paymaster	49.60	W. H. Neal, Lebanon, Tenn.
4	Cocke's Prolific	49.50	State Experiment Station, Baton Rouge, La.
5	Ferguson's Yellow Dent	49.07	Ferguson Seed Farms, Sherman, Texas.
6	Yellow Creole	47.78	State Experiment Station, Baton Rouge, La.
7	White Calhoun Hybrid	47.46	State Experiment Station, Baton Rouge, La.
8	Allen Big Ear Prolific	46.82	Dr. L. C. Allen, Hoschton, Ga.
9	Mosby's Prolific	46.78	Misisissippi Experiment Station, Agricultural College, Miss.
10	Mosby's Prolific	46.29	State Experiment Station, Baton Rouge, La.
11	Cocke's Prolific	45.42	Mississippi Experiment Station, Agricultural College, Miss.
12	Calhoun Red Cob	45.21	A. B. Çuret, New Roads, La.
13	Calhoun Red Cob	45.10	State Experiment Station, Baton Rouge, La.
14	Calhoun Red Cob	44.18	F. S. Voak, Tallulah, La.
15	Calhoun Red Cob	42.86	I. L. Haile, Linville, La.
16	Sentell's White Dent	42.86	Shreveport Mill & Elevator Co., Shreveport, La.
17	White Calhoun	42.32	State Experiment Station, Baton Rouge, La.
18	Calhoun Red Cob	42.10	J. R. Crumpton, Minden, La.
19	Calhoun Red Cob	41.57	R. L. Moore, Sterlington, Route, Monroe, La.
20	Chisholm	39.96	Ferguson Seed Farm, Sherman, Texas.
21	Rogers	37.50	D. H. Wallace, Verda, La.
22	Surcropper	36.64	Ferguson Seed Farm, Sherman, Texas.
23	Yellow Calhoun Hybrid	34.39	State Experiment Station, Baton Rouge, La.
24	Yellow Calhoun	33.96	State Experiment Station, Baton Rouge, La.
25	Calhoun Red Cob	31.07	W. S. Powell, Stonewall, La.

All of the above varieties were planted April 16th, in four foot rows, 200 lbs. of acid phosphate and 50 lbs. of nitrate of soda per acre being applied in drill ahead of planting and 75 lbs. of nitrate of soda per acre as a top dressing at last cultivation. Harvested September 26-27.

VELVET BEAN VARIETIES

Plot 2, North of Barn

	Variety	Lbs. per Acre	Grain %	Bu. per Acre	Source of Seed
1	Osceola	1680	52	15	Chris Reuter, New Orleans, Louisiana.
2	Early Bunch	900	60	9	Chris Reuter, New Orleans, La.
3	Early Speckled	2010	67	22.5	Chris Reuter, New Orleans, La.
4	Tracy's Early Black	1800	50	15	U. S. Dept. Agriculture, Washington, D. C.
5	Early Arlington	1650	71	19.5	U. S. Dept. Agriculture, Washington, D. C.
6	Osceola	1680	58	16.5	Everett Seed Company, Atlanta, Ga.
7	Ninety Day	1650	71	19.5	Everett Seed Company, Atlanta, Ga.
8	Bush	750	60	7.5	H. G. Hastings Seed Co., Atlanta, Ga.
9	Extra Early	2370	69	27.5	H. G. Hastings Seed Co., Atlanta, Ga.
10	One Hundred Day	1560	67	17.5	T. W. Wood & Sons, Richmond, Va.
11	Bunch	990	57	9.5	T. W. Wood & Sons, Richmond, Va.
12	Osceola	1500	58	12.8	T. W. Wood & Sons, Richmond, Va.

All of the above varieties were planted May 10th. Plowed up and replanted No. 6 and No. 7, May 28th. When beginning to run, supports of poles or 48 inch woven wire placed for each variety separately. The growth was stopped by a killing frost late in September.

FORAGE CROP VARIETIES,

Plot 2, North of Barn.

Variety: Soy Beans	Bu. per Acre	Hay per Acre	Source of Seed
1 Tokio	....	....	State Experiment Station, Baton Rouge, La.
2 Sable	11.20	1.015	State Experiment Station, Baton Rouge, La.
3 Laredo	5.64	1.28	State Experiment Station, Baton Rouge, La.
4 Barchett	....	.886	State Experiment Station, Baton Rouge, La.
5 Mammoth Brown	....	1.62	State Experiment Station, Baton Rouge, La.
6 Ebony	9.45	1.26	O. M. Scott & Sons Co., Marysville, Ohio.
7 Morse	7.35	.577	O. M. Scott & Sons Co., Marysville, Ohio.
8 Illinois 13-19	7.00	.665	O. M. Scott & Sons Co., Marysville, Ohio.
9 Ohio 9035	7.79	.822	O. M. Scott & Sons Co., Marysville, Ohio.
10 Wilson	8.40	.682	O. M. Scott & Sons Co., Marysville, Ohio.
11 Virginia	10.50	1.33	O. M. Scott & Sons Co., Marysville, Ohio.
12 Ototan	....	1.773	Chris Reuter, New Orleans, La.
13 Mammoth Yellow	....	1.81	Chris Reuter, New Orleans, La.
14 Biloxi	....	1.89	Chris Reuter, New Orleans, La.
15 Ototan	....	1.78	Everett Seed Company, Atlanta, Ga.
16 Mammoth Yellow	....	1.96	Everett Seed Company, Atlanta, Ga.
17 Biloxi	....	2.14	Everett Seed Company, Atlanta, Ga.
18 Ototan	....	1.92	H. G. Hastings Co., Atlanta Ga.
19 Mammoth Yellow	....	1.94	H. G. Hastings Co., Atlanta, Ga.
20 Biloxi	....	2.31	H. G. Hastings Co., Atlanta, Ga.
21 Laredo	....	1.44	H. G. Hastings Co., Atlanta, Ga.

No. 1 failed to germinate. Nos. 4, 5, 13, 14, 15, 16, 17, 18, 19, 20 and 21 matured no seed.

All of the soy bean varieties were planted May 10th. The earlier varieties all matured some beans; the later ones, although seed pods formed, matured no sound beans, consequently no grain yield was given.

DEMONSTRATION—3 YEAR ROTATION FIELD.
AREA NO. 1

Previous Crop: Corn and Velvet Beans.

Corn: Cost of Producing Crop	Total Cost	Per Acre Cost	Total	Per Acre
Preparation and Planting	$22.25	$2.47		
Fertilizer	37.00	4.11		
Seed:				
Corn, $5.50; Beans and Peas, $8.00..	13.50	1.50		
Cultivation of Crop	29.76	3.31		
Harvesting	13.50	1.50		
	$116.10	$12.89		
Yields in Pounds			9,916	1,101.8
Yields in Bushels			141.65	15.74
Value of Corn Crop @ $1.00 per Bu..			$141.65	$15.74
Net Value of Crop	25.64	2.85		

A very good stand of cowpeas was gotten and made a fairly good growth but so few matured that no effort was made to have them harvested, therefore they are not figured in the production of the field. A very poor stand of beans came up and matured nothing. The beans and peas planted in the area listed below, were also unproductive.

The lower part of Area No. 1 was too wet to prepare and plant at the same time as the above and was planted May 15th, but was given very little attention.

LOWER PART OF AREA No. 1.

Corn: Cost of Producing Crop	Total Cost	Cost per Acre	Total	Per Acre
Preparation and planting	$16.13	$5.37		
Fertilizer	6.30	2.10		
Seed	2.00	.67		
Cultivation	22.50	7.50		
Harvesting	4.50	1.50		
Total Cost	$51.43	$17.14		
Yield in Pounds			2.310	770
Yield in Bushels			33	11
Value of corn crop @ $1.00 per Bu..	33.00	11.00		
Net loss on crop	$18.43	$6.14		

DEMONSTRATION—3 YEAR ROTATION FIELD
Area No. 2 (11 Acres).
Previous Crop: Cotton.

Corn: Cost of Producing Crop	Total Cost	Cost per Acre	Total	Per Acre
Preparation and planting	$39.00	$3.55		
Fertilizer for corn and beans	53.08	4.83		
Seed: Corn, $7.00; Beans, $6.88	13.88	1.26		
Cultivating of crops	41.08	3.74		
Harvesting corn	16.28	1.48		
Total Cost	$163.32	$14.86		
Yield in Pounds			14,137	1,285.2
Yield in Bushels			201.96	18.36
Value of corn crop @ $1.00 per Bu.	201.96	18.36		
Value of corn crop above cost	$38.64	$3.50		

A fairly good stand of velvet beans was grown in the corn middles, enough being picked to base an estimate of the yield in beans per acre. The area picked, being approximately three-eighths of an acre, yielded 351 lbs., equivalent to 936 lbs. per acre. At $20.00 per ton, the bean crop on 11 acres, 10,296 lbs., would be valued at $102.96, or $9.36 per acre. The net value of the corn crop and the bean crop gives this area a value of $12.88 per acre above cost of production. Due to the abnormal amount of wet weather during the late fall and early winter, it was impossible to harvest the beans. They were grazed by the cattle during the winter.

DEMONSTRATION—3 YEAR ROTATION FIELDS.
Previous Crop: Corn and Cowpeas.

Cotton: Cost of Producing and Marketing Crop	Total Cost	Per Acre Cost
Preparation of land	$74.70	$4.40
Fertilizer	79.90	4.70
Seed	16.05	.94
Cultivation of Crop	188.02	11.06
Poison for weevils and Army worm	89.11	5.25
Labor in applying	11.15	.66

DEMONSTRATION—3 YEAR ROTATION FIELDS—Continued.

Cotton: Cost of Producing and Marketing Crop		Total Cost.	Per Acre Cost
Harvesting (9200 lbs. @ $1.00)		92.00	5.41
Ginning, bagging and ties		60.84	3.58
		$611.77	$36.00
Value of lint produced on 17 acres—	Per 17 A.		
3420 lbs. @ 31½c per lb.	$1,077.30		
Value of seed, 5780 lbs. @ $45.00	130.50		
Total Value of Lint and Seed	$1,207.80		
Total Cost of producing crop	611.77		
Net Value of Crop, above Cost	$ 596.03		
	Per Acre		
Value of Lint and Seed per Acre	$ 71.05		
Total Cost per Acre of Crop	36.00		
Net Value of Crop, Above Cost	$ 35.05		

In cost data, only expenditures on the crop are listed. No consideration is given to such items as taxes, interest on investment, depreciation, and overhead.

GENERAL REPORT OF ALL COTTON GROWN AT THE NORTH LOUISIANA EXPERIMENT STATION, 1923

Location	Acreage	Lbs. Produced	Yields per Acre	Date of Planting
Plot C Exp. F	1.44	1061	736.80	April 28
Plot 2 Exp. F	1.44	1509	1047.91	June 2
Plot 7 Exp. F	1.44	1323	918.75	May 7
Plot 8 Exp. F	.46	451	980.43	May 7
Area 3 Exp. F	17.	9200	541.17	May 3-5
Total	21.78	13544		
Total amount Lint		4938		
Total amount Seed		8606		
Lint per cent of entire crop, 36%.				

PECAN ORCHARD.

Variety	No. of Trees	Condition	Yield per Tree	Maturity
Jerome	2	Good	5 lbs	Earliest
Moneymaker	4	Good	12½ lbs	Early
McAllister	2	1 Good 1 Poor	7¼ lbs	Early
Schley	3	2 Good 1 Poor	11 lbs	Early
Nelson	2	1 Good 1 Poor	28 lbs	Late
Stuart	2	Good	13 lbs	Medium
Success	3	1 Good 2 Poor	10 lbs	Medium
Centennial	1	Good	3 lbs	Late
Columbian	1	Good	5 lbs	Late
Senator	2	1 Good 1 Poor	17 lbs	Late
Carman	1	Good	15 lbs	Medium
Frotscher	2	Good	13 lbs	Medium
Teche	1	Good	9 lbs	Medium
Curtis	2	Good	10½ lbs	Medium
Delmas	1	Good	*10 lbs	Very Late
Texas Prolific	2	Fair	None	
Pabst	2	Good	8½ lbs	Late
President	1	Fair	6 lbs	Late

*Immature.

The four Moneymaker trees are in the lot east of the barn and west of the main dwelling house, the balance being in the plot west of the Station buildings. Most of the trees are in their twelfth year and are in thrifty condition. In the fall of 1922, bur clover and rye were planted in the plot and after being grazed in late spring 1923, was flat broken and disced, being left in that condition, no cultivated crops being grown there during 1923. It is now sodded in bur clover.

STATION NO. 4.

RICE EXPERIMENT STATION, CROWLEY, LA.

J. Mitchell Jenkins, Superintendent of the Station and Assistant Agronomist, Office of Cereal Investigations, Bureau Plant Industry, U. S. Department of Agriculture.

During the spring months of the year 1923, the prospects of having a successful year were anything but promising, due to constant rains interfering with seed bed preparation and with seeding. The precipitation for the period from March 1 to June 30, inclusive, was greater by nine and one-half inches, according to our records, than during the same months of any one of the past thirteen years. This delayed planting and prevented the proper execution of experiments in the date of seeding. All other experiments were seeded very near the time fixed for so doing. Throughout the remainder of the growing season, climatic conditions were about normal and the results secured from the several experiments were in the main, satisfactory. The total annual precipitation amounted to 71.52 inches, and is the heaviest ever recorded at this Station. The yields obtained in the various plats were smaller, with few exceptions, than those of last year. The heavy precipitation in the spring may account for this, in that the soil was kept wet, preventing proper action of the air and other factors. Farmers in southwestern Louisiana also report low yields. Another factor that might have influenced the yield is that of temperature. During July and August, the mean temperature was practically the same as recorded for those months in previous years. However, the daily maximum temperatures were rather low. The highest recorded was only ninety-five degrees F., and this on one day only. This lack of extreme temperatures during spring and summer might have kept the temperature of the soil and water below that required to produce a maximum yield. The lowest temperature of the year was twenty-seven degrees F., and occurred March 20th.

The ability of certain rices to withstand adverse conditions, is very pronounced in the results secured from different varieties in the increase plats. Acadia produced the highest yield on the Station. Fortuna produced satisfactory yields in the several places in which it was grown, and in every instance, the yield was greater than other commercial rices having nearly the same length of growing period. This rice is gaining in popularity from year to year, and the limited amount of land suitable for seed production is the main factor preventing its more rapid spread throughout the rice growing regions of Louisiana and Texas. Every farmer questioned this fall, stated that he secured his highest yields from Fortuna variety. The Commercial acreage devoted to Vintula was quite small. However, those growing it stated that it was the only early maturing variety that produced a satsifactory yield in their vicinity.

This is the fifth year that a certain group of experiments with commercial fertilizers has been conducted on the same land, and in the same manner. The results of this year substantiate what was indicated each of the four years previous, and that is, that no commercial fertilizer can be relied upon to sufficiently increase or maintain the yield of rice on land similar to that upon which these experiments are conducted. It is true that certain elements alone, and in combination, increased the yield, however in no case was this increase sufficient to pay for the cost of application. It is also equally true that certain elements alone and in combination, actually reduced the yield. Farmers who have been using commercial fertilizer for a number of years have become more skeptical each year, and many have discontinued its use.

In the general rotation with soybeans, conducted on the greater part of the Station, as well as in the special rotation experiments, the yields of rice secured, prove, as heretofore reported, that it is from the growing of the soybean in rotation with rice that the lands of southwestern Louisiana are to be made more productive and the quality of rice improved. The yields of rice secured this year on land that produced a crop of soybeans in 1922, are far in excess of those secured from commercial fertilizer, or from land allowed to lie idle. Not only has the yield of rice been increased by the cultivation of the soybean, but weed growth, especially red rice, has been eradicated and kept under control; and it requires scarcely half the work to obtain a good seed bed following a crop of soy beans that is necessary following a crop of rice.

If the beans are harvested when mature, an average yield of about ten bushels may be expected. At the present time, there is not enough seed produced of the Biloxi variety to supply the demand. It is not necessary in growing the soybean in rotation with rice, to plant before the last of May or first of June, and the harvest will not take place before the early part of November. Thus it is seen that teams and labor employed in growing rice can be employed in seeding the bean crop after the greater part of the rice crop has been seeded; and in harvesting the bean crop after the main part of the rice crop has been harvested.

Throughout the rice growing section of the State, there is general dissatisfaction on the part of rice growers as to the yields and quality of rice they are producing. There is, also, a general desire on the part of most rice growers to do something to better this condition. At a conference of rice growers, bankers, canal operators, millers and representatives of other organizations interested in the development of the rice industry, held at the Rice Experiment Station, September 25th, the Station representatives presented some of the results obtained, during the last several years, indicating the lack of returns from the application of commercial fertilizers over a period of four years; the advantages derived from the growing of the Biloxi soybean in rotation with rice; and the increased yields of rice obtained from deep and thorough soil preparation and late seeding. The work of the Station was endorsed by the members of the conference and a definite program of work, based on the results presented, was adopted without a dissenting vote. This program is to be projected by the forces of the Extension Division of Louisiana State University.

The Extension Division of Louisiana State University, on September 1, appointed a Rice Specialist. This Specialist will make his headquarters at the Rice Experiment Station and devote his entire time to the matter of taking to the rice farmer, through the County Agents, and by other means, a program of work based on results obtained at this Station.

On January 12, 1923, there was issued by the United States Department of Agriculture, in cooperation with the Louisiana

Agricultural Experiment Station, Department Bulletin No. 1127, entitled, "Some New Varieties of Rice", by Charles E. Chambliss, Agronomist in Charge of Rice Investigations, Office of Cereal Investigations, Bureau of Plant Industry, and J. Mitchell Jenkins, Superintendent of the Rice Experiment Station, Crowley, La., and Assistant Agronomist, Office of Cereal Investigations, Bureau of Plant Industry. This bulletin includes a description of the rice plant and a botanical and agronomic description of seven new varieties that have been developed in the course of cooperative experiments at the Rice Experiment Station, Crowley, La., and of four varieties now widely grown in this country. The agronomic performance and adaptation of each variety, including a full description of the conditions under which the experiments were conducted, are discussed in detail. The commercial value of the milled rice of the new varieties from a culinary standpoint is indicated.

During the spring the Bureau of Entomology of the United States Department of Agriculture resumed their investigations pertaining to rice insects, and appointed a Junior Entomologist to devote his entire time to this work.

Beginning January 1st, this Station has been providing laboratory space for a unit of the United States Public Health Service. This unit is composed of three members, who devote their entire time to investigations pertaining to malaria, under rice field conditions.

EQUIPMENT.

The Station equipment was in no way increased during the past year. The work is less efficient, due to the bad health of one of the mules belonging to the United States Department of Agriculture. This reduces the number to four head of sound animals, all of which are required at one time, to operate most of the implements. It was necessary to hire additional animals during seeding time.

STATION NO. 5.

FRUIT AND TRUCK EXPERIMENT STATION, HAMMOND, LA.

B. Szymoniak, Horticulturist in Charge.

The Fruit and Truck Experiment Station has been in operation two years.

During 1923 the season was generally favorable, that is, not marked by extremes of drought or moisture, except in the early part of the spring, when strawberries were just setting fruit; March 19th, 1923 we had a freeze, 27 degrees F., which injured the strawberry crop markedly.

Further improvements were made the past year in the way of clearing land and making ditches for drainage. A tenant house was built to accommodate the labor and a barn is being built in place of the many shacks that are now on the farm. A substantial woven wire fence has been built along the Hammond-Covington highway which now passes through the farm. An entrance road has been graded and planted to Phoenix canariensis palms. This entrance road has two concrete columns marking the entrance, with concrete and galvanized iron pipes cattle guard, and an iron gate for wagons to pass through. A road through the middle of the farm has also been established. Other minor improvements consist of a garage, laundry shed, concrete floor in brooder house and Delco house. Old unsightly fences that have outlived their usefulness, have been torn down, trees and shrubbery have been planted around the dwelling house for landscape effect. Everything possible is being done to make the farm attractive with the least expenditure of money.

Since strawberries form the main industry in this region of the State, most of the attention has been given to that line. The soil in this section is low in fertility, especially the cut-over pine flats. The drainage is poor and the humus content low. The conditions are however subject to amelioration. Keeping these in mind, three projects have been established; namely, (1) Fertilizer Test for Strawberries; (2) Strawberry Variety Tests; and (3) Rotation. To further utilize the soils advantageously in this section of the State, other projects have been started. We have planted two acres in MacDonald blackberries, interplanted with Lucretia dewberries for pollination. These will come into bearing in May and June, 1924. The plants have made a satisfactory growth on low Hammond silt loam land with fairly good drainage. No fertilizers were used, as it is intended to give them a trial under adverse, rather than ideal, conditions.

Other projects started and promulgated are on Pecan Culture, with special reference to pruning, and for testing out new varieties in coooperation with the U. S. Department of Agriculture, Washington, D. C. Muscadine Grape Culture is also in cooperation with the Federal Department.

One year's results and conclusions, or summary are submitted as follows:

FERTILIZER TEST FOR STRAWBERRIES.

The object of this test is to find the best method of fertilizing strawberries. The Klondike variety was used, as this is the variety planted commercially in this section.

Sixty thousand plants are involved in the test. Equal number, that is twenty thousand were planted during the months of September, October and November, 1922. The time at which the plants arrived from Arkansas and North Carolina was very dry so that they did not thrive, and had to be replanted with native plants. This is an indication that it is unwise to depend on imported plants, as the soil and season here may not be favorable for setting plants when they arrive. The home grown plants were set out late when there was plenty of moisture, consequently they were more vigorous.

The following table shows the record of amounts and mixtures of fertilizers applied. Application was made three weeks in advance of setting out the plants.

AMOUNTS PER ACRE.

Pounds 16% Acid Phosphate	Pounds 14.8% Nitrate of Soda	Pounds 50% Sulphate of Potash	Yields Crates
600	0	0	31.9
480	0	45	45.4
480	120	0	43.0
360	0	75	42.7
360	120	45	42.9
360	240	0	50.0
240	0	120	40.0
240	120	75	54.1
240	240	45	48.9
240	360	0	51.5
120	0	165	36.4
120	120	120	36.9
120	240	75	40.5
120	360	45	40.7
120	480	0	37.6
0	0	225	28.0
0	120	165	16.2
0	240	120	14.2
0	360	75	22.1
0	480	45	14.2
0	600	0	13.2
*No fertilizer applied.			12.2*

The above data indicate that the fertilizer combination of 240 pounds of 16% acid phosphate, 120 pounds of 14.8% nitrate of soda, and 75 pounds of 50% sulphate of potash gave the highest yields, 54.1 crates of marketable fruit per acre as compared with 12.2 crates on rows where no fertilizer was applied. This was new land never in cultivation before.

STRAWBERRY VARIETY TEST.

The object of this test is to compare the yields of different varieties with the Klondike variety, which is grown commercially exclusively in this section. The plants were obtained from Judsonia, Arkansas. They were planted under identical conditions, as far as possible, all the plants receiving the same care and attention, planted on the same day and on the same type of soil.

YIELD OF STRAWBERRY VARIETIES AND DATE OF MATURITY.

500 Plants of each variety, planted at rate of 12,000 per acre.

	Variety	Pints	Date, 1923
1	Missionary	54.0	April 9
2	Gandy	6.9	April 24
3	Aroma	20.0	April 21
4	Lady Cornellie	14.5	April 19
5	Klondike Improved	36.1	April 12
6	Evening Star	9.2	April 21
7	Premier	14.7	April 12
8	Texas	30.0	April 12
9	Nick Ohmer	75.6	March 26
10	Excelsior	5.3	April 12

No fertilizers were used in these tests. The land had never been in cultivation before but had been used as a pasture. The type of soil is Hammond silt loam.

The results of one season indicate that the Nick Ohmer variety was the earliest and highest yielder, producing at the rate of about eighty-four crates of twenty-four pints each, per acre, as compared with thirty-six crates per acre yield of the Klondike variety, under the same apparent conditions. No fertilizers were used. The results may be very different when tried in combination with fertilizer tests.

All the varieties were uniformly graded and sold for the same price on the market, averaging $3.50 per crate.

MUSCADINE GRAPE CULTURE.

About two acres of land were set out to 580 vines of Thomas variety, 58 vines, Flowers and 58 vines of Scuppernong. The vines have made one season's growth; are all living and making satisfactory progress. The object of planting these is to determine the practicability of commercializing the crop as natural fruit or in the form of some by-product.

The following new varieties were obtained from the United States Department of Agriculture, through Mr. Chas. A. Dearing at Willard, N. C.—

5 V7-R11 (late male); 5 V36-R12--B2 (perfect flowering) 5 Luola; 5 Memory; 3 Hopkins (similar to Memory) 6 Staminate; 5 Latham; 3 Kilgore; 6 V70-R1-B2; 6 V62-R14-B4 (perfect flowering) 6 V42-R11-B2. Total, 55 vines.

A cover crop of cowpeas was planted and these were turned under for humus. Since the vines have only made one season's growth, no results are as yet obtainable.

BLACKBERRY CULTURE.

About two acres of Hammond silt loam land were planted to MacDonald variety of blackberry, which is a cross between the blackberry and the dewberry. These were set out December 26th, 1922. They made one year's growth which looks very promising.

The blackberry plants were set out because of a request from farmers and interested members of the Hammond Chamber of Commerce, to test a crop that would follow the strawberry crop. The blackberry is indigenous to this section and the cultivated varieties may make a favorable succession crop to the strawberry. The fruit ripens the latter part of May and first of June.

ROTATIONS.

Three plots of new land have been cleared, each approximately five acres in area.

In Plot No. 1 strawberry plants were set out in the fall of 1922, harvested in 1923, and indicated in the report of Fertilizers for Strawberries.

June Corn was planted after the strawberry plants were plowed up, on four acres. One acre of the five was reserved for strawberry plants. This one acre produced thirty thousand plants which were sold to the Boys and Girls Clubs; and fifty thousand plants, which were set out November and December 1923 for further test of fertilizers for strawberries.

In Plot No. 2 one acre was planted to Porto Rico yams and four acres to cowpeas, which were plowed under for humus.

In Plot No. 3, five acres were planted to corn, which produced eighty bushels of corn. As soon as the corn was gathered, the land was prepared for strawberry plants which were set out the latter part of November and early in December. Four acres were set out for fertilizer tests.

The system of rotations has not yet been definitely determined upon, as so much depends on the condition of the seasons and the available labor to handle the crops.

SATSUMA ORANGE CULTURE.

A good deal of interest has been shown in Satsuma orange culture, and a demand for information on the subject, especially with reference to hardiness. One hundred trees were set out in the spring of 1923. The trees were very small when they were set out. The small trees were selected because they were cheaper, costing twenty-five cents apiece, as compared with $1.00 or more for larger trees. The Owari Satsuma variety was planted because it was considered best in yield and quality. The trees have made one year's growth; they have been cultivated, mulched, with manure, and a cover crop of cowpeas planted and this turned under for humus.

At this date, (January 22, 1924) they do not look very promising. The freeze of January 5th, followed by freezes of the 8th and 9th, and again repeated January 20 and 21 have been severe tests of endurance to the trees. It is yet too early to tell what the damage may be. Protection of the trees seemed to be out of the question as a strong wind was blowing, with temperature 15° above zero F, on the night of January 5th. Trees that were wrapped up in straw suffered as much as plants not covered. Plants froze in the dwellings where there was no heat.

CHANGES IN STAFF.

Pierre Hernandez, Assistant Agronomist, State Station, resigned June 1923 to take post graduate work at Cornell University.

Lowrey B. Eastland, In Charge of Exhibits, resigned February 1923, to go into the life insurance business.

R. C. Calloway, Manager of the Experiment Station Dairy, was transferred to the University Staff, December 1, 1923, as Manager of L. S. U. Dairy.

PUBLICATIONS.

Bulletin No. 185—The Sugar Cane Mealy Bug and Its Control in Louisiana, By Ernest R. Barber, Scientific Assistant, U. S. Bureau of Entomology, in Cooperation with Agricultural Experiment Stations, L. S. U.

Bulletin No. 186—Second Preliminary Report on Parasites Found in Ruminants at the Municipal Abattoir, Baton Rouge, by G. Dikmans.

Bulletin No. 187—"Hogging Down Crops", Cost of Producing Crops and Pork, by A. F. Kidder and W. H. Dalrymple.

Bulletin No. 188—The Sweet Potato Weevil in Louisiana and Its Control, by Chas. E. Smith.

Bulletin No. 189—Melilotus Indica on Fall Plant Sugar Cane, by W. G. Taggart.

Annual Report for 1922. Thirty-Fourth Annual Report of the Agricultural Experiment Stations of L. S. U. & A. M. College to the Governor, by W. R. Dodson, Director.

RECEIPTS AND DISBURSEMENTS, AGRICULTURAL EXPERIMENT STATIONS, 1923.

STATE FUND.

Receipts

State Appropriation	$ 40,000.00	
Sales	5,366.73	
Refunds	1,543.37	
Interest on Daily Balance	101.64	
Loan, Evangeline Bk. & Tr. Co.	4,500.00	
Transferred from Fertilizer and Feed Stuffs	8,000.00	
Total Receipts for twelve months		$ 59,511.74

Disbursements

Salaries	$ 21,344.92	
Labor	12,409.93	
Publications	410.69	
Postage and Stationery	776.84	
Freight and Express	428.15	
Heat, Light, Water and Power	715.87	
Seeds and Sundry Supplies	2,092.13	
Fertilizer	771.60	
Feed Stuffs	1,949.58	
Library	65.22	
Tools, Implements and Machinery	1,865.14	
Furniture and Fixtures	17.14	
Scientific Apparatus	15.55	
Live Stock	1,725.80	
Travel Expense	2,465.97	
Building and Repairs	1,777.26	
Scientific Supplies (Consumable)	208.61	
Communication Service	248.86	
Contingent Expense	2,609.81	
Loan Repaid to Evangeline Bank	5,500.00	
Total Disbursement for twelve months	$ 57,399.07	
Deficit, January 1, 1923	1,329.14	
Total Disbursements and Deficit	$ 58,728.21	
Balance December 31, 1923	783.53	
Grand Total		$ 59,511.74

HATCH FUND.

Receipts

Treasurer, United States	$ 15,000.00	
Total Receipts	$ 15,000.00	
Deficit, December 31, 1923	910.89	
Total Receipts and Deficit		$ 15,910.89

Disbursements

Salaries	$ 8,524.95	
Labor	4,014.15	
Stationery and Office Supplies	58.15	
Scientific Supplies	.50	
Feed Stuffs	399.74	
Sundries	290.20	
Fertilizer	25.92	
Communication Service	70.93	
Travel Expense	456.36	
Transportation of Things	57.48	
Publications	542.37	
Heat, Light, Water and Power	563.34	
Furniture and Fixtures	18.50	
Library	501.41	
Tools, Implements and Machinery	124.08	
Buildings and Repairs	162.10	
Contingent Expenses	76.42	
Total Disbursements	$ 15,886.60	
Deficit, January 1, 1923	24.29	
Grand Total		$ 15,910.89

ADAMS FUND.

Receipts

Treasurer, United States	$ 15,000.00	
Total Receipts	$ 15,000.00	
Balance on hand January 1, 1923	974.39	
Total Receipts and Balance		$ 15,974.39

Disbursements

Salaries	$ 13,187.40	
Labor	765.00	
Postage and Stationery	23.87	
Freight and Express	21.06	
Heat, Light, Water and Power	313.13	
Chemical Supplies	447.19	
Seeds and Sundries	90.72	
Feed Stuffs	163.60	
Library	82.04	
Furniture and Fixtures	.50	
Scientific Apparatus	12.21	
Travel Expense	30.89	
Total Disbursements	$ 15,137.61	
Balance, December 31, 1923	836.78	
Grand Total		$ 15,974.39

FERTILIZER AND FEED STUFFS FUND.

Receipts

*Commissioner of Agriculture	$ 30,600.47	
Refunds	54.79	
Total Receipts	$ 30,655.26	
Balance, January 1, 1923	3,030.61	
Total Receipts and Balance		$ 33,685.87

Disbursements

Salaries	$ 16,458.42
Labor	2,084.63
Postage and Stationery	300.44
Freight and Express	92.90
Heat, Light, Water and Power	567.96
Chemical Supplies	1,412.58
Sundry Supplies	193.64
Communication Service	74.35
Feed Stuffs	16.10
Library	29.40
Tools, Implements and Machinery	12.65
Furniture and Fixtures	129.55
Scientific Apparatus	280.09
Travel Expense	648.67

Contingent Expense	64.40	
Building and Repairs	57.57	
Total Disbursements	$ 22,423.35	
*Transferred to State Fund	8,000.00	
Total Disbursements and Transfer	$ 30,423.35	
Balance, December 31, 1923	3,262.52	
Grand Total		$ 33,685.87

SUMMARY OF ALL DISBURSEMENTS, ALL FUNDS, FOR YEAR 1923.

Receipts

State Fund	$ 59,511.74	
*Fertilizer and Feed Stuffs Fund	30,655.26	
Adams Fund	15,000.00	
Hatch Fund	15,000.00	
Total	$120,167.00	
*Less Transfer to State Fund	8,000.00	
Total Receipts	$112,167.00	
Balance, Fertilizer and Feed Fund, Jan. 1, 1923	3,030.61	
Balance, Adams Fund, Jan. 1, 1923	974.39	
Total Receipts and Balance		$116,172.00

Disbursements

Salaries	$ 59,515.69
Labor	19,273.71
Publications	953.06
Postage and Stationery	1,553.44
Freight and Express	599.59
Heat, Light, Water and Power	2,160.30
Seeds and Sundry Supplies	2,666.69
Fertilizer	797.52
Feed Stuffs	2,529.02
Library	678.07
Tools, Implements and Machinery	2,001.87
Furniture and Fixtures	165.69
Scientific Apparatus	307.85
Live Stock	1,725.80

Travel Expense	3,601.89
Building and Repairs	1,996.93
Scientific Supplies	2,068.88
Contingent Expenses	2,750.63
Loan Repaid to Evangeline Bank & Trust Co.	5,500.00
Total	$110,846.63
Deficit, January 1, 1923	1,353.43
Total Disbursement and Deficit	$112,200.06
Total Balance, Dec. 31, 1923	3,971.94
Grand Total	$116,172.00

STATEMENT OF RECEIPTS AND DISBURSEMENTS OF EXPERIMENT STATION DAIRY FUND, 1923.

Receipts

Milk	$6,574.60
Live Stock	899.50
Miscellaneous	137.84
Total Receipts	$7,611.94
Balance, January 1, 1923	16.35
Total Balance and Receipts	$7,628.29

Disbursements

Labor	$2,982.06
Seeds and Sundries	943.11
Feed Stuffs	3,481.67
Tools, Implements and Machinery	82.11
Buildings and Repairs	72.59
Total Disbursements	$7,561.54
Balance, December 31, 1923	66.75
Total Disbursements and Balance	$7,628.29

ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

FOR

1924

TO THE GOVERNOR

BY

W. R. DODSON, DIRECTOR

EXPERIMENT STATION STAFF.

Resident—Louisiana State University, Baton Rouge, La.

W. R. DODSON, A. B., B. S., Director.

W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterinarian.

C. W. EDGERTON, Ph. D., Plant Pathologist.

E. C. TIMS, Ph. D., Assistant Plant Pathologist.

W. G. TAGGART, B. S., Assistant Director, Sugar Station.

A. F. KIDDER, B. S., Agronomist and Assistant Director, State Station.

W. E. HINDS, Ph. D., Entomologist.

W. G. BRADLEY, Assistant Entomologist.

G. L. TIEBOUT, B. S., Horticulturist.

HARRY MORRIS, D. V. M., Bacteriologist and Assistant Veterinarian.

A. P. KERR, M. S., Chief Chemist, Fertilizer and Feed Stuffs Laboratory.

W. P. DENSON, B. S., Assistant Chemist.

J. H. JOLLY, B. S., Assistant Chemist.

J. L. FARR, M. S., Assistant Chemist.

C. C. MORELAND, B. S., Microscopist.

C. R. HUMMEL, B. S., In Charge of Records.

R. P. SWIRE, B. S., Treasurer.

MRS. RUTH HEIDELBERG, Secretary to the Director.

J. K. McHUGH, Librarian.

J. D. DeARENSBOURG, Farm Manager.

ROGERS DODSON, A. B., Specialist in Forage Crops.

Audubon Park, New Orleans, La.

J. F. BREWSTER, Ph. D., Research Chemist.

Wm. L. OWEN, B. S., Bacteriologist.

Rice Experiment Station, Crowley, La.

J. MITCHELL JENKINS, B. S., Superintendent.

HELEN ANDRUS, Stenographer.

North Louisiana Experiment Station, Calhoun, La.

SIDNEY STEWART, B. S., Superintendent.

Fruit and Truck Experiment Station, Hammond, La.

B. SZYMONIAK, B. S., Horticulturist.

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE

BATON ROUGE, LA., February 1, 1925.

To His Excellency, Henry L. Fuqua,
Governor of Louisiana,
Baton Rouge, La.

My dear Sir:

I have the honor to transmit herewith a report of the work, including a summary of the receipts and expenditures, of the Agricultural Experiment Stations of the Louisiana State University for the year 1924.

This report covers all the important work at the five experiment stations and the financial statement of all funds from all sources administered through the Experiment Station office and for which the Director of Experiment Stations is responsible.

The vouchers and accounts have been regularly examined each six months by the Supervisor of Public Accounts and reports have been made to you as to the results of each examination. You may recall that the Supervisor has reported: ''All payments were carefully examined and same found to be supported by good and satisfactory vouchers.''

Copies of this report will be sent to the United States Department of Agriculture, at Washisgton, D. C., and to other Experiment Stations, as required, for the report of the Hatch and Adams funds, and a sufficient number will be printed to enable us to supply all interested parties, including the members of the Legislature, public boards, libraries, and the leading agriculturists.

I am,

Respectfully,
W. R. DODSON, Director.

GENERAL STATEMENT.

The reports of the heads of departments are, for the most part, as written by them for publication. Where crop yields are involved, it has seemed best, under some projects, to give the full data; in others, general statements have been deemed sufficient. It does not seem to be practicable to adopt a uniform plan that would be suitable to all lines of work, for giving annual reports.

The season was excessively dry in all portions of the State, and crop yields generally were far below the average for field crops. In the hill sections of North Louisiana, feed crops were almost an entire failure, due to unusually dry weather. The cotton crop was greatly reduced, in many regions not yielding more than 25 to 35 per cent of a normal crop. The fairly good price for the staple helped materially to compensate for the low yields. In a few regions the cotton crop was very good, and cotton growers were in better condition than they have been for a number of years.

The cane crop was the lowest average yield ever recorded. This was due to the combined influence of dry weather, the prevalence of sugar cane diseases, and to the poor condition of soils following the wet season of 1923. The sugar industry of the state has been in greatest distress since the Civil War. However, we feel confident that cane production in Louisiana will continue and that through the breeding of new varieties, the selection of seed cane and improved farm practice, the industry will prosper again in the near future as we have normal seasons.

Test fields of the Sugar Experiment Station were established in the fall of 1924, at different points in the Sugar Belt, for enlarging our work in testing new seedling canes, conducting fertilizer experiments and for demonstrations in crop rotation and seed cane selection. We regard this as an important step of progress in the work. This matter is briefly discussed under the heading, "Sugar Cane Test Fields."

The experiments in field crops at the old Experiment Station, at Baton Rouge, were transferred to new areas on the new University farm, and the old plots will be devoted to the production of hay crops until the Board of Supervisors determines what disposition is to be made of this land.

A very considerable portion of the time of the Director of the Experiment Stations has been given to the work of the Building Committee of the New University. He has continued to serve on public service bodies, as follows: (1) As President of the Cotton Production Council, for correlating experimental work of the southern experiment stations, on boll weevil control, cotton fertilization, etc.; (2) as Chairman of a Committee of the Land Grant College Association, on the Purnell Bill, for the further endowment of the experiment stations by the Federal Congress, the Director has carried on extensive correspondence and prepared briefs in behalf of this measure, and has made two trips to Washington, D. C., for Congressional hearings. We are confidently looking forward to the expansion of our research work through the enactment of the Purnell Bill; (3) as a member of the Advisory Council of the Agricultural Commission of the American Bankers Association. At their urgent request he visited the A. and M. Colleges of Texas, Alabama, Georgia and Florida, to help perfect an organization of the cooperative relationships of the banker and the agricultural colleges. An address was given before the Commission and many other bankers at the Chicago meeting of the American Bankers Association, in October, 1924. A pamphlet on the relations of banking and farming was prepared for publication at the request of the Commission.

SUGAR EXPERIMENT STATION.

The laboratories for chemical and bacteriological research have remained at Audubon Park, New Orleans, but will be moved to Baton Rouge during the summer of 1925.

CHEMICAL DEPARTMENT.

J. F. BREWSTER, Research Chemist.

Cane Juice Clarification.

The study of the chemistry of juice clarification was continued with special reference to change in acidity. For a long time it has been known that when cane juice is treated with milk of lime in the cold, as is done in clarification in Louisiana so that the natural acidity of the juice is neutralized or reduced, there occurs a pronounced rise in acidity, due to certain decompositions when the limed juice is heated. The reasons for this rise in acidity have never been satisfactorily explained. It has been difficult to verify in the laboratory many statements that have been made concerning it. It is believed that a means has been found in this laboratory to prevent this rise in acidity, at least temporarily. A fuller report will be made when the findings are more completely verified.

Preparation of Decolorizing Carbons.

The main line of work of the chemical research laboratory during the past year has been upon the preparation of decolorizing carbons from vegetable materials and the study of certain methods involved with the object of finding definite and uniform procedure. This study may have a bearing upon the practical production of decolorizing carbons, since numerous samples of very satisfactory carbons have been obtained.

Collaborative Determination of Moisture in Sugar Products.

The duties of an associate referee of the Association of Official Agricultural Chemists have been performed in the past year by the research chemist. The work consisted in compiling methods for the determination of moisture, collecting and preparing samples and forwarding these to collaborating chemists. Upon receipt of results these were tabulated and studied and a report thereon presented at the meeting of the association in October at Washington. Both beet and cane products were analyzed as in 1923. Analysis of lower grade cane products offer greater difficulties than the corresponding beet products. The solution of the difficulties involved seems to be more of a problem of research rather than of one of repeated trial of existing methods, which so far seem to be inadequate. Due to lack of time at present, the research chemist has resigned the duties of Associate Referee.

Cooperation With Bureau of Chemistry.

During the past year the Sugar Station has been assisting the nutrition laboratory of the Bureau of Chemistry, U. S. Department of Agriculture, in obtaining sugar cane for the determination of its nutritional value. The nutrition study is designed to find out what the cane possesses and what it lacks in the food elements necessary to the maintenance and growth of animals.

Visits to Louisiana Sugar Houses.

Visits were made by the writer during the past cane grinding season to several sirup and sugar houses of the State, where, through the unfailing courtesy of owners, managers and others connected with the plants, the opportunity was afforded of studying manufacturing conditions. The Station's technical assistance and advice has met with approval.

Miscellaneous.

A great deal of office work has been done in the past year by the research chemist, who thereby was prevented from putting in full time in the laboratory. Much of this has been along lines of technical correspondence and has been in reply to questions of manufacture or analysis of sugar cane products. It is considered as a part of the service the Station is able to render. Several samples of experimental cane were tested for planters in November and December.

Two inventors sent hydrogen electrodes to this laboratory to be tested in connection with their possible value for use in determination of hydrogen ion concentration of sugar liquors. One of these electrodes shows great promise and will probably be generally available.

THE DEPARTMENT OF BACTERIOLOGY.

WM. L. OWEN, Bacteriologist.

The work of this department during the past year has been almost exclusively confined to the investigations of the various phases of sugar deterioration in storage. Miscellaneous demands for data and information on the canning of syrups and molasses, and upon fermentation problems connected with the preparation of industrial alcohol from molasses, have required more time and attention than formerly. On the other hand, the purely research activities of the department have been more specialized than before. Our previous investigations having reached the stage where a practicable means for the prevention of sugar deterioration was indicated, our logical course was to concentrate on that line of attack, in order to demonstrate the value of the indicated preventive measures. Having already determined that the mold fungi occurring in sugars and causing their deterioration are very sensitive to the presence of free CO_2 in the films of molasses surrounding the sugar crystals, and that certain torulæ occurring in sugars readily form CO_2 from the reducing sugars present, our next step was to determine the following factors in connection therewith, viz: (1) What concentration of CO_2 is necessary to prevent the development of fungi in sugars? (2) Is this variable for the different species of fungi causing sugar deterioration? (3) What amounts of CO_2 are ordinarily formed by the torulæ occurring in sugars? (4) Does this vary with the different species? If so, which are the most efficient and what are the conditions necessary for their maximum efficiency? (5) What conditions determine the retention of CO_2 in the films surrounding the sugar crystals?

Our first problem was to devise some method for estimating the CO_2 held in the films surrounding sugar crystals. This has required considerable study and a great deal of experimental work, for none of the methods for CO_2 determination that have been elaborated for other purposes seemed applicable to this particular one. We have at last evolved a method which seems to give concordant results, and which we believe will enable us to determine the factors enumerated above. We now have in progress experiments in which sugars with known amounts of CO_2 in their films are inoculated with cultures of deteriorative mold fungi. Other experiments are in progress where definite amounts of carbonated molasses have been used for filming sugars prior to their inoculation with fungi. Experiments are also in progress to determine the number of torulæ required to give protection to sugars of varying "factors of safety," and others to determine the variation in the retention of CO_2 by molasses of varying densities.

FACTORY EXPERIMENTS AT THE HENDERSON SUGAR REFINERY.

Through the courtesy of the management of the Henderson Sugar Refinery of New Orleans, we carried out some experiments in the filming of sugars in the centrifugals with specially inoculated molasses. These experiments gave very promising results, but were discontinued because at that time our method of CO_2 determination was not sufficiently well developed to carry out the proper control of the experiments, and the apparatus used for filming the sugars did not answer the purpose very satisfactorily. It is planned to continue with these experiments, using Cuban Raws, filmed with inoculated molasses, using our laboratory centrifugal, where the conditions may be more accurately controlled.

MISCELLANEOUS INVESTIGATIONS.

There have been various occasions during the year when the cooperation of this department has been sought in various scientific problems for investigation. During the early part of the year repeated inquiries led to our conducting some experiments to determine optimum hydrogen ion concentration for the maximum efficiency in the alcoholic fermentation of Cuban and Louisiana blackstrap molasses. While the results obtained did not indicate any definite point, where the pH, and maximum, were closely correlated, they tended to confirm what our previous investigations had shown as regards the dissimilar acid requirements of the two types of blackstraps.

Some attention was also given during the year to the utilization of certain cultures of bacteria for the production of higher alcohols and acetone. One of the cultures used in these experiments was isolated by this department several years ago from the interior of borer infested cane. These experiments carried on with the kind cooperation of Dr. J. F. Brewster, the Research Chemist, showed that, although some acetone was formed, it was not produced in sufficient quantities to warrant its recovery.

MISCELLANEOUS REQUESTS FOR INFORMATION.

Requests for information from this department have shown a marked tendency to increase during the past year. We have received such requests chiefly from the following sources: (1) From sugar manufacturers, for information on the deterioration of sugars in storage, and means for its prevention. (2) From molasses distillers and vinegar manufacturers, for information on the pure culture system of fermentation, etc. (3) From feed manufacturers, for information on the prevention of spoilage of feeds. (4) From candy manufacturers, on the prevention of deterioration of these products in storage. (5) From the canners of syrups and molasses, for information on canning and processing temperatures, and upon blending of syrups and molasses.

MISCELLANEOUS REQUESTS FOR COOPERATION.

The Department of Chemistry of Yale University, through Dr. Harold Hibbert, has solicited our cooperation in securing levan, for studies upon the constitution of cellulose. We are assisting him, to the extent of supplying him with cultures of levan forming bacteria, and directing him as regards their propagation. Request for yeasts and bacterial cultures are frequently received by this department, and as far as time and facilities permit we always endeavor to supply these demands, especially where the cultures are required for scientific investigation.

One of the best evidences of the almost exclusive claims of the Louisiana Experiment Station upon original data obtained from the research investigations of the deterioration of sugars in storage are the frequent and insistent demands upon this department for opinions regarding the keeping qualities of sugars, and the probability of their deteriorating under different conditions of storage. Such requests have been particularly frequent during the past year, and in the month of July the head of this department was called to New York to serve as an expert witness in some litigation involving the question of the deterioration of sugars in transit. It is quite obvious that these requests for an opinion based upon the results of our investigations arise from the fact that our publications on the subject have convinced the public at large that sugar deterioration is subject to the operation of natural laws, now well understood. Therefore whenever and wherever it occurs it is rightly believed that there is a definite responsibility, either on the part of the manufacturer for producing a product that will not keep, or upon the transportation company for unduly exposing it to unfavorable weather conditions and thereby predisposing it to deterioration. Both of these responsibilities may be quite clearly established with the data that this department has obtained in the course of its investigations.

PUBLICATIONS DURING THE YEAR.

The papers published during the year, or in course of publication, are as follows:

Alcohol from Cane Blackstraps, Journal of Industrial and Engineering Chemistry, Vol. 16, page 387.

Some Factors Affecting the Efficiency of Molasses Distilleries, Louisiana Planter Annual Reference Book of the Sugar Industry, July, 1924.

Cane Syrups and Molasses, Their Composition, Consumption and Production in the United States. A paper read at the 28th annual convention of the Association of American Dairy and Drug Officials at Chattanooga, Tenn., August, 1924.

FIELD WORK.

AT BATON ROUGE.

The field work at the new Station at Baton Rouge was fully established during the season of 1924, but owing to unprecedented dry weather much of the work was begun under unfavorable conditions. The land had to be ditched, roads and headlands established, mule barns and tool sheds were remote from the field, some of the land had not been cultivated for many years and had to be subdued. However, good progress has been made and the 1925 season is starting off under very favorable conditions.

FERTILIZER AND ROTATION EXPERIMENTS.

Two main lines of experiments were worked out and put under way. One is designed to fit closely into the present plantation practice of three-year rotation, and to further answer the need for information as to fertilizers, best legumes to be used and the most economical use of these legumes, as well as other plant material met with on the plantation.

The second series of experiments is planned with the intention of finding a better system of rotation, and growing cane on a more profitable basis. These experiments are closely related to the first series but in a four-year rotation system.

VARIETIES.

All variety work is in cooperation with the office of Sugar-Plant Investigations, Bureau of Plant Industry, U. S. Department of Agriculture.

Over 1200 varieties were planted. About 500 of these show immunity or a high degree of tolerance to mosaic; some of the 500 varieties made but little growth and showed on analysis a very low percentage of sucrose.

Three hundred and sixteen varieties proved good enough to warrant further planting. These were divided into two classes: first, those that showed on analysis a sugar content equal to or better than P. O. J.-234, or a sugar content of commercial value associated with an extra heavy tonnage; second, those not so good in sugar or tonnage, but of average measure. The first of these were planted to the limit of cane on hand; the second, to a lesser extent.

ANALYSES OF SOME OF THE BEST U. S. SEEDLINGS.

Variety	Brix	Sucrose	Apparent Purity
U. S. 468	17.03	12.54	73.61
U. S. 672	18.44	13.00	70.55
U. S. 666	18.50	14.38	77.51
U. S. 754	19.17	15.97	83.30
U. S. 996	16.66	12.62	75.87
U. S. 1133	17.27	14.17	82.04
U. S. 1138	16.19	12.10	74.85
U. S. 1444	17.54	12.97	74.94
U. S. 1489	17.24	12.64	73.31
U. S. 1541	15.78	12.00	76.03
U. S. 1557	16.83	12.30	73.90
U. S. 1703	16.90	12.79	75.60
U. S. 1712	17.78	13.97	78.57

P. O. J.

P. O. J.-234, 36, 213, and 2379 grew tall and stooled well. P. O. J.-228 and 979 grew larger than the others, but not so tall. P. O. J.-100 made a very poor growth.

ANALYSES OF P. O. J. VARIETIES.

Variety	Brix	Sucrose	Apparent Purity
P. O. J. 36	17.54	13.39	76.33
P. O. J. 213	17.14	12.82	74.79
P. O. J. 228	16.64	14.60	87.74
P. O. J. 234	17.04	13.15	77.17
P. O. J. 826	15.74	11.24	71.41
P. O. J. 2379	16.24	12.05	74.19

One Louisiana seedling, a large pruple cane, grew very well, showed but little effect from mosaic disease and showed on analysis: Brix, 19.84; Sucrose, 15.43; and Purity, 86.49.

SUGAR CANE TEST FIELDS.

Six test fields were established and some work begun at each. These fields are located at Glenwood, Reserve, Raceland, Sterling, Youngsville, and Angola. The American Sugar Cane League cooperated in selecting five of these fields and will aid in making them serve their purpose.

Tests under way include selections of tolerant strains of the older varieties; treatment of seed cane for root rot; comparative tests of new varieties, and fertilizer and rotation experiments. Due to the prolonged drought, the full line of experiments was put in on only three of the fields, and these where the owners of the plantation prepared the land for planting by irrigation.

VARIETIES OF CANE SENT OUT TO TEST FIELDS.

P. O. J. 36, 139, 213, 228, 234, 826, 979, 2379.

U. S. 429, 534, 595, 653, 672, 639, 712, 766, 828, 843, 999, 1057, 1159, 1436, 1489, 1712; Uba, Cayana 10, cavengerie.

In line with the test field work, we sent out 133 bundles of the new varieties to planters who came to the station and selected canes that they wanted to try out. These planters have promised to give the canes careful attention and report to the station as to comparative merit.

The two lines of work combined give us test fields in West Feliciana, Pointe Coupee, East Baton Rouge, West Baton Rouge, Iberville, Ascension, Assumption, St. James, St. John, Lafourche, Terrebonne, St. Mary, and Lafayette Parishes.

PLANTERS' MEETINGS.

The combined forces of the Experiment Station and Extension Division took part in a series of meetings throughout the sugar territory during August and September. These meetings were held at the request of the Agricultural Committee of the American Sugar Cane League, and were largely attended.

At these meetings cane diseases and means of combating them were the chief subjects of interest. The general situation today and the most practical ways of bringing about a return to prosperity were thoroughly discussed. As a result of these meetings, there was a general awakening of the sugar planters and a hearty response to recommendations, especially to those having to do with seed selection.

CORN.

Two varieties of corn were used in planting the cane fields: Calhoun Red Cob and Yellow Creole.

Average yield of Calhoun Red Cob, 20 bushels per acre.

Average yield of Yellow Creole, 21 bushels per acre.

LEGUMES.

The Biloxi soy bean made by far the best growth of anything under test. Cowpeas that were gotten in just before one of the few showers which fell during the growing season grew well, but with that exception the cowpea offered but little competition to the Biloxi soy beans.

Velvet beans failed entirely.

Plantings of other varieties of soy beans were made, but, due to lack of moisture, none of them grew more than to twelve inches in height.

DEPARTMENT OF AGRONOMY.

A. F. KIDDER, Agronomist.

HUGO F. STONEBERG, Assistant. Detailed by Office of Cereal Investigations, Bureau of Plant Industry, U. S. Department of Agriculture.

E. K. BREEDEN, Farm Manager.

The work has gone about the same as in previous years. The writer was absent during April and May. A number of projects were dropped, among them being all those on soil fertility, and several others were changed.

CROP PRODUCTION.

The variety tests were continued. Only a few of the usual corn varieties were included and no spacing work was done, so the continuity of this project is broken. Of the varieties planted, the prolific ones produced the highest yields. Hastings' Prolific, Mosby's Prolific and Cocke's Prolific have made the most corn per acre for several years.

The oat varieties were planted in the fall of 1923. The rod row system was used. Three rows of each variety with four replications were planted. Patterson and McGehee were the highest in yield. From data for the past five years these two varieties are leading all others. Practically no difference can be found in these two oats.

Seed of the various Red clover strains supplied by the Office of Forage Crop Investigations, Bureau of Plant Industry, were planted in the fall of 1923. Those from foreign countries showed very little mildew, while the native strains showed from 30% to 50% infection. The seed from France and from Chili made the most hay per acre. A comparison of White Dutch and Ladino was made. The Ladino made a more rapid growth and lived considerably longer after the first cutting.

Three plantings of soybean varieties were made as follows: April 25, May 20 and June 17. The last planting was a failure due to weather conditions. The first planting gave the best results. From the percentage of germinable beans and the yield, Ebony, Hamilton, Black Eyebrow and Early Brown were the leading early varieties. Among the late ones, Otootan made the largest yield of hay (3.6 tons per acre) and Mammoth Yellow, Biloxi and Otootan were the best in seed production with 15.2, 12.8 and 12.1 bushels per acre, respectively. The data for several years on this project have been prepared for publication.

Only one planting of sugar beet varieties was made. The sucrose content and purity was practically the same as in previous years. The yield per acre was low. The data for four years on this project are being published as Bulletin 192.

This season was excellent for cotton. The varieties that had been producing from ⅓ to ½ of a bale per acre made from 1 to 1½ bales. The leading varieties for this season are Coker's Cleveland, Cook 1346, Salsbury and Cleveland 903. The data on this project for the past five years are being prepared for publication.

The different times of planting corn was continued in co-operation with the Station Entomologist. The highest yields were obtained by corn planted about the first part of April.

Kobe lespedeza was planted and its growth very carefully studied. It was considerably more vigorous than the common strain and appears quite promising.

PLANT BREEDING.

No work on cotton was done. The oat breeding that was started in 1919 was continued. Because of the absence of the writer, no hybridizing was attempted, but several promising strains previously secured have been saved. The leading strains made exceptionally high yields this year.

The corn work in conjunction with the Station Plant Pathologist was continued under slightly different conditions. One hundred eighty ears of White Calhoun were selected and divided into three groups, according to indentation of kernel. Effect of root rot and suckers upon yield for each type of kernel was studied. Data for the past five years are being prepared for publication.

The corn breeding project in cooperation with the Office of Cereal Investigations, Bureau of Plant Industry, was continued. The object of this project is to try to get high yielding strains of corn which possess good shuck protection to prevent insect damage in the field and after harvesting. Fair progress is being made.

DEPARTMENT OF ANIMAL PATHOLOGY.

HARRY MORRIS, Bacteriologist and Assistant Veterinarian.

During 1924 the work in the department was reduced to one project. The major part of the time was devoted to University work, which included teaching and care of the live stock at the University farm. The minor part of the time was devoted to Station work.

ANTHRAX.

During the past year Louisiana experienced the most extensive outbreak of anthrax in the history of the state. The large number of animals on the University farm offered a good experimental field for the practice of control measures. During the year the University owned about one thousand animals, including horses, mules and cattle. All the animals were inoculated with anti-anthrax serum and spore vaccine during the months of March and April. Sanitary precautions were also practiced. The water holes were fenced and all drinking water was pumped from deep wells into cement drinking tanks.

Not a case of anthrax developed among these animals, although the disease appeared on adjoining farms with a number of deaths. Anthrax was rather common on the farm before it was purchased by the state.

Fly transmission tests were continued with several of the larger species of the genus Tabanus. These flies would not feed upon experimental animals while in captivity. A number of these flies were collected in the field from infected horses and mules. In a few cases anthrax bacilli were recovered from the bodies of these flies.

On account of the outbreak of anthrax during the year a large number of specimens were received at the laboratory for microscopic examination.

The Head of the Department, Dr. Dalrymple, has carried on his usual large correspondence with the live stock owners in the state concerning animal feeding and disease control. He has also contributed many articles to the press on subjects pertaining to animal production.

OTHER WORK.

During the spring of 1924 quite an outbreak of forage poisoning in horses and mules developed throughout the state. A number of cases appeared among the mules on the college farm, but the outbreak was soon checked. The feed was changed and all animals were given a laxative followed by anti-botulinus serum. Following this treatment all sick animals made a quick recovery.

A few cases of abortion have appeared in the dairy herd, but by observing sanitary rules the disease has been kept under control and a large crop of calves has been produced.

A few cases of actinomycosis, or "lumpy jaw," developed among the dairy cattle. The disease was checked by applying the usual remedies. This is the first time this disease has ever appeared among the college live stock.

Preparations are being made for a study of anthrax infection of animals through materials injected under pasture conditions, and the survival of soil infestation with anthrax.

DEPARTMENT OF ENTOMOLOGY.

W. E. HINDS, Entomologist.

WM. G. BRADLEY, Assistant Entomologist.

On April 16, 1924, the writer became Entomologist of the Louisiana Experiment Stations. The principal insect problem under investigation has been the

CONTROL OF THE MEXICAN COTTON BOLL WEEVIL.

The work was located principally at the old and new Experiment Station grounds at Baton Rouge, with thirty plats of cotton provided, in ten cuts.

On account of an unusual combination of fall and winter conditions, very few weevils survived the winter of 1923 to 1924 to attack cotton early in the fields and before breeding began. After the 1st of June, 1924, the weather became very unusually dry and hot, thus controlling the breeding of weevils after eggs began to be deposited. The total rainfall occurring at our experimental fields from July 1 to November 30 amounted to about three and three-fourths inches, or a deficiency of approximately twenty inches for this period. Maximum temperature during July and August ranged up to 101° to 102° F. Rainfall of a measurable amount fell upon only seven or eight dates during July and August.

As a result of the unusually light weevil survival of the winter, no pre-square poisoning was possible, and the infestation in plats planned for poisoning work was so low that in several cuts of cotton no poisoning whatever was done during the entire season. Weevil infestation in the unpoisoned check areas of cotton never rose high enough to fully stop the formation of bolls. In most cuts the maximum infestation occurring up to September 1 ranged between 30% and 40% in the untreated check areas. While excellent control of the weevils was secured wherever calcium arsenate dust was applied, the margin of difference between the infestation in dusted and undusted areas was not sufficiently great, on account of the natural control of the weevils, to give any marked or significant results so far as crop production was concerned.

With the occurrence of a rain of about 1½ inches on August 10, a new growth started on several cuts and a top crop, amounting to approximately 25% of the total production for the season, was secured on some cuts.

The entire area of cuts in treated and check areas used amounted to approximately 8½ acres, with approximately one-fourth of the area in check plats and three-fourths in poison tests.

The blooming of cotton and the effect of rainfall in varying amounts and occurring at various hours during the daytime, upon the setting or shedding of bolls therefrom, were studied from August 6 to August 23, by tagging blooms opened on those dates and collecting the tags as the bolls fell from the plants and following those that matured until the cotton was picked. During this period it was found that the percentage of bolls maturing was highest from blooms of August 6, when the work was started (36%) and decreased steadily thereafter to about 5% at the end of the period of examination. In this series of tests, some 1200 bolls were tagged and an average of 21% of all of these bolls matured and were picked. This would indicate that it is exceedingly important to protect the setting of bolls during the period in which the bloom on the cotton plant is increasing to its maximum, and that control of the weevil after the maximum of the blooming period is reached is of relatively less importance, so far as the maturity of the crop is concerned. The rainfall as actually recorded did not seem to have any injurious effect whatever upon the setting of bolls, but this does not mean, of course, that rainfall is never injurious to boll setting.

In studies of relationship existing between the spacing of cotton plants and the setting of fruit thereon, it was found that plants spaced eight to twelve inches apart on the average produced twenty or more bolls per row foot, whereas, plants spaced twenty to thirty inches apart produced only eleven bolls per row foot. These figures emphasize the advisability of close spacing of the cotton plant in the row.

A study of the weevils in the field showed that the occurrence of weevils in considerable numbers in the bloom was coincident with emergence of the second generation in the field and with the occurrence of what is commonly called the migratory period of the weevil. This happened at Baton Rouge at about the second week of August, 1924.

Tag records made on some 1200 blooms produced after September 1, 1924, showed that a large percentage of the first formed blooms after this new bloom started set bolls which matured for the top crop of cotton. With the droughty conditions prevailing, the percentage of bolls set decreased very rapidly as the plants were checked in putting on the new top growth, by the continued drought. It was found that blooms which were riddled more or less by weevil feeding on the petals set a slightly higher percentage of bolls than blooms in which the petals were perfect when the tags were attached. The average percentage of bolls set and matured on blooms opened from September 8 to September 29 and including both perfect and petal-injured blooms, showed approximately 20% producing matured bolls in the top crop.

Test of the comparative effectiveness of calcium arsenate vs. lead arsenate showed that the lead arsenate was fully as effective in weevil control as the calcium arsenate, under the climatic conditions prevailing in 1924. With dust applied on the same dates, the plants dusted with calcium arsenate had far less visible evidence of the dusting than those dusted with lead arsenate. It happened that the lead arsenate dusted plat slightly outyielded the calcium arsenate plat, but the factors of drought effect and the occurrence of defoliation on the plants in parts of these two areas rendered the results inconclusive, as a whole.

Tests were made of daylight dust vs. the usual method of application while dew is on the plant. A commercial and a home-mixed daydust were thus tested, with fairly satisfactory results in each case. In an average of two cuts, there was shown a gain of over 200 pounds of seed cotton per acre from the use of straight calcium arsenate, as usually applied; and also approximately the same increase, with an average of the two daydusts applied.

A test of Hill's Mixture, with three applications made between July 23 and August 12, showed a yield of something over 200 pounds of seed cotton per acre less than was obtained upon calcium arsenate dusted plats adjoining.

Picking on the earliest maturing plats began on August 20 and the final picking on top crop was completed about November

25. The maximum yield upon any cuts gave an average of 1920 pounds of seed cotton per acre and the highest yielding plat in any cut gave 2012.7 pounds of seed cotton per acre. The minimum yield in any plat was 1273 pounds of seed cotton per acre and the average yield on all seven treated cuts, including check areas, amounted to 1546 pounds of seed cotton per acre, or better than a bale to the acre, on the average, wherever treatment of any kind was applied. No decided increase in yield as a result of poisoning was evident in an average of the entire poison area, and the abnormal climatic conditions make it inadvisable to draw any conclusions as to the effectiveness of treatment, from total yields obtained, but the effectiveness of treatment was clearly shown to be satisfactory in a study of the infestation records taken at weekly intervals during the entire season.

In an extensive series of toxicity tests, conducted in field cages, some twenty-two series of tests were conducted during the period from August to November. In each series some five different methods of treatment were in comparison at one time and in addition to the treated cages, a series of weevils was kept throughout this period, in unpoisoned cages. In the entire series, some thirty-six materials or mixtures of materials were tested out for periods ranging from about six to fifteen or more days after the dust application was made. In these tests, plants were selected which were favorable for the experimental work and prepared for the treatment, which was given as nearly as possible as it would be given in field applications. Cages were then placed over the plants and, as a rule, lots of ten weevils recently collected in unpoisoned fields were placed in the test cages. At the end of twenty-four hours' exposure to the poison, careful examinations were made and all weevils were removed from the cages, with note as to the number found dead. The living weevils were then kept for twenty-four hours or more, and the number dying in the first twenty-four hours after removal from the poison plant was credited to the mortality due to the poison. Death of weevils beyond this time was possibly attributable to other factors and therefore ignored in the record as given. In these tests some 8,737 weevils were utilized. Of these, 1,262 were in check cages, unpoisoned, and the mortality among these averaged 12.8% during the entire fall period. In the poison tests, of various kinds, 7,475 weevils were used and among these the average mortality with all poisons used was 55.4% from twenty-four hours' exposure to the poison and with the supply of weevils renewed each day during the week or more following the application of the poison. The average mortality due to poison appears, therefore, to have been 42.6% from each twenty-four hour exposure. Of course, mortality would have run considerably higher than this had the same lot of weevils been left on the plants for more than twenty-four consecutive hours. Among the standard calcium arsenate dust applications it appeared that the treatments were 1.6% more effective where the dust was applied to plants moist with dew than where similar dusts were applied to plants that were dry at the time of application. The daydust materials used contained some agent for sticking the poison to the plant, and with these materials applications made when the plants were moist with dew showed 15.9% greater mortality than when the material was applied to the dry plants. Dust mixtures containing 2% of actual nicotine, or 5% of nicotine sulphate containing 40% of nicotine, showed quite a high degree of mortality among the weevils for several days following the application, and such a dust containing no arsenate appeared to be nearly as effective in weevil control in these cages as did straight calcium arensate applications. In these cage tests, the mortality where sweetened mixtures of various compositions were applied, was very nearly equal to that where straight dusts were applied. They did not show any greatly increased toxicity for syrup mixtures over the straight dust applications in twenty-four hours' exposure of weevils thereto. In the entire series of tests, including all materials, there was an average of 4% greater mortality when the applications were made to plants moist with dew than in the applications made to plants that were dry. This is an increase of nearly 10% in efficiency due to the presence of moisture on the plants at the time the poison was applied. Practically no rainfall occurred during the period covered by these experiments.

To facilitate the preparation of home-made dust mixtures, such as appear to be advisable for the use of planters, in the control of the cotton boll weevil and of the cotton plant louse at the same time, we have devised a home-made dust mixing machine which can be made in hardly more than two hours of time, and at a cost that would involve less than 50 cents expenditure, if all materials should have to be purchased. With one of these outfits the planter can stock calcium arsenate and nicotine sulphate and then prepare home-made dust mixture on the basis of 95 parts of calcium arsenate and 5 parts of a 40% solution of nicotine sulphate, and thus have available, at its maximum strength, a dust suitable for application to the cotton for control of both weevils and cotton plant louse

The initial tests have indicated that these mixtures can be used on the cotton with entire safety to the foliage, and when applied at night, or when the air is still and conditions such as would be recommended for dusting cotton for weevil control, a very high degree of control of plant lice may be secured also, and with an additional expense amounting to only about 60 cents per acre, for each application, on account of the nicotine sulphate used

In preparation for hibernation tests ten wire screen cages were constructed and in these lots, varying in number from practically 100 to 1,000 weevils, were enclosed on different dates, ranging from October 7 to November 29, at which time killing frost had destroyed all green cotton in the vicinity of Baton Rouge. In these tests, 7,326 weevils were started in hiberation. Hibernation in the field began about November 24, and was practically complete by December 1, at Baton Rouge.

TIME OF PLANTING EXPERIMENTS FOR THE CONTROL OF THE SOUTHERN CORN ROOT WORM, DIABROTICA 12-PUNCTATA FAB—SEASON 1924.

WM. G. BRADLEY.

For the 1924 work on this project, eleven weekly plantings of corn were made on Plat 1G at the old experiment station farm. The first planting was made on March 3 and the last on May 23. The first five plantings consisted of three acre-rows each, while the last six included six rows each. No root worm injury was noted in the first three plantings, the first damage from this source occurring in the planting of March 31. The maximum injury appeared in the planting of April 8, in which the infestation ran up to 38.6%. From this date the infestation to the succeeding plantings decreased rapidly, and no injury was recorded after the planting of April 29. On account of adverse climatic conditions, the first two plantings had to be plowed up. Table 1 gives the result of examination of corn in the various plantings and the yields are given in Table 2.

APPLICATION OF VARIOUS SUBSTANCES AROUND YOUNG CORN TO CONTROL THE SOUTHERN CORN ROOT WORM.

At a time when it was thought that the greatest injury by the corn root worm would be experienced, extra rows of corn were planted to be treated with various substances in order to determine their value as a control measure for the corn rootworm. These plantings were made on March 31 and the regular weekly planting for that date was used as a check. Although, as shown in Table 1, the maximum infestation did not appear until the planting of the following week, yet sufficient injury was experienced to show that none of the materials used were of sufficient value to warrant further experimentation, at least with the strengths used and the methods of application employed. The substances applied and the results from their use are given in Table 3. For the carbon disulphide mixture, a stock solution was first made from the following materials: fish oil soap, 1 pint; water, 7 pints; carbon disulphide, 21 pints. The emulsion was applied to the soil about the young corn by means of a watering can, after first being diluted to the strengths given in the table.

The creosote dust was a 1% mixture of crude creosote in a carrier of Kaolin dust. This was dusted on the ground around the young corn plants with a hand dust gun and 200 gms. of dust were used on each row.

With the regular weekly planting of April 8 as a check, three extra rows were planted and 6⅞ pounds of "Inside Insecticide," supplied by the Chipman Chemical Co. of New York, were put in each row at the time the fertilizer was applied. Although the planting of this date experienced the highest infestation of the year, no beneficial effects were noted from the use of the insecticide.

TIME OF PLANTING EXPERIMENTS FOR THE CONTROL OF THE CORN EAR-WORM, HELIOTHIS OBSOLETA, AND THE SUGAR-CONE MOTH-BORER, DIATRAEA SACCHARALIS.

For this work the same plats of corn were utilized as those in the experiments with corn root worm. Injury by rats, birds and the corn root worm caused a serious loss of stalks in some of the plantings and, therefore, the percentages had to be figured from a relatively small number of stalks. The damage caused by the borer was small as compared with former years. Table 4 gives the result of examination, by rows, of corn in the different plantings, while results from the weekly plantings are given in Table 5.

In making these examinations, all the stalks in the middle row of the three-row plantings and the central four rows in the six-row plantings were split open and the shucks on the ears were removed to observe ear-worm injury. The table shows a steady rise in infestation by borers up to the planting of May 8, after which it remained fairly constant. The ear-worm infestation proved high and fairly constant in all the plantings except in that of May 8, when it dropped to 58.6%.

CUTTING OUT DEAD HEARTS AS A CONTROL MEASURE FOR THE SUGAR-CANE MOTH-BORER.

For an experiment to determine the value of cutting out dead hearts (stalks so injured as to cause the central leaves to die) as a control measure for the sugar-cane moth-borer, two fields were chosen, separated from each other and from other fields of corn by a distance of 300 yards. One of these fields was to be used as a check, while the "dead hearts" were to be cut in the other field. Although these fields were watched carefully from the time the corn sprouted, no dead hearts were noted at any time, due, possibly, to the relatively low infestation by borers this year.

RELATIVE ATTRACTIVENESS OF SWEET CORN AND FIELD CORN IN RESPECT TO THE SUGAR-CANE MOTH-BORER AND CORN EARWORM.

The same two cuts used in the above project were utilized in an experiment to determine the relative attractiveness of sweet corn as compared to field corn in regard to the above-named insects. For this work the sweet corn was planted (after the field corn was up about 6 inches) in four rows equidistant from each other and from the ends of the field and running perpendicularly to the rows of field corn. Each hill of sweet corn was planted in the center of the ridge used for the sweet corn row. When the corn had reached the roasting ear stage each stalk of sweet corn was cut and examined for borer damage and its ear for earworm injury. At the same time, an equal number of field corn stalks, each cut within two feet of a sweet corn stalk, were examined in a similar manner. The following is the result of this examination:

RESULT OF EXAMINATION OF STALKS AND EARS OF FIELD AND SWEET CORN.

	Plants With Borers Present	Plants With Evidence of Borers	Plants With No Borers	Ears With Earworms Present	Ears Showing Earworm Injury	Uninjured Ears	Per Cent Borer Damage to Plants	Per Cent Earworm Damage to Ears
Field corn	12	28	47	1	46	40	46	54
Sweet corn	6	19	62	1	51	35	28.7	59.7

TABLE NO. 1.

Result of Time of Planting Experiments for the Control of the Southern Corn Root Worm. 1924. Project 143.

Date Planted	Date Examined	Rows	Hills With Stalks	Hills With No Stalks (vacant)	Number of Stalks (total)	Injured Stalks, Number	Per Cent of Injured Stalks
March 3	April 8	3	63	237	89	0	0
March 11	April 8	3	92	208	130	0	0
March 24	April 8	3	169	131	404	0	0
March 31	April 17	3	217	85	540	36	6.6
April 8	April 28	3	189	110	414	160	38.6
April 14	May 8	6	79	521	130	21	16.1
April 21	May 17	6	399	201	1129	45	3.9
April 29	May 17	6	488	112	1534	27	1.7
May 8	May 23	6	407	193	1244	0	0
May 15				No injury.			
May 23				No injury.			

TABLE NO. 2.

Yields of Corn in "Time of Planting" Experiments to Avoid Injury by the Corn Earworm, the Corn Root Worm and the Sugar Cane Moth-Borer. 1924. Projects 140 and 142.

Rows	Planting	No. of Stalks		Total Yield. Average per Row per Planting (lbs.)
		Actual per Row per Planting	100% Stand	
8 and 10	March 24	52	100	9.12
20 and 22	March 31	73	100	5.25
27 and 28	April 8	62	100	5.37
35, 39 and 40	April 21	68	100	14.00
45 and 46	April 29	82	100	10.8
51 and 52	May 8	50	100	6.5
2 and 6	May 15	..	...	7.37
33 and 34	May 23	..	...	10.5

TABLE NO. 3.

Result of experiments to determine the efficiency of various substances applied to the ground around corn, in controlling the southern corn root worm, *Diabrotica duodecimpunctata.*

Substance Used	Strength	Date Applied	Date Corn Examined	No. of Rows	No. of Stalks Injured by Rootworms	No. Stalks Examined	Per Cent of Stalks Injured by Rootworms
Carbon disulphide	1–500 ...	Apr. 12.	Apr. 17.	1	2	152	1.3
Carbon disulphide	1–250 ...	Apr. 12.	Apr. 17.	1	7	206	3.4
Carbon disulphide	1–166 ...	Apr. 12.	Apr. 17.	1	9	244	3.7
Mercuric chloride.	1–1000 ..	Apr. 12.	Apr. 17.	3	34	626	5.4
Creosote dust....	1%	Apr. 14.	Apr. 17.	3	31	596	5.2
Check	... .	....	Apr. 17.	3	36	540	6.7
Inside insecticide.	6⅞ lbs. per row	Apr. 8.	Apr. 28.	3	168	521	32.0
Check	... .	....	Apr. 28.	3	160	414	38.6

Result of examination of corn stalks to determine the effect of treating the soil, at time of planting, with "Inside Insecticide" on injury by the corn earworm and sugar cane moth borer.

Substance Used	Rate Used	Date Applied	Date Corn Examined	No. of Rows	No. Stalks Injured by Borer	% of Injury by Borer	No. Ears Injured by Earworm	% of Ears Injured by Earworm
Inside insecticide.	6⅞ lbs. per row	Apr. 8	Aug. 27	2	14	39.6	33	94.3
Check	....	....	Sept. 4.	1	6	50	19	95

TABLE NO. 4.

Result of examination of corn stalks in time of planting experiments for the control of the corn earworm and the sugar cane moth borer

Row	Date planted, 1924	Date Examined	Stalks With Borers Present	Stalks Showing Evidence of Borers	Borer Free Stalks	Ears With Earworms Present	Ears Showing Earworm Injury	Ears Showing No Earworm Injury	% of Stalks Injured by Borers	% of Stalks Injured by Earworms
9	March 24	August 14	2	3	23	0	23	6	17.8	79.0
12	March 31	August 14	2	9	27	0	33	11	28.9	75.0
15	March 31	August 27	5	12	26	0	35	9	39.5	79.5
18	March 31	August 27	5	14	20	0	28	11	48.7	71.8
21	March 31	August 27	3	16	19	0	26	12	50.0	68.4
24	April 8	August 27	3	3	14	0	18	2	26.0	90.0
25	April 8	August 27	2	6	7	0	15	1	53.3	93.7
26	April 8	September 4	3	3	12	0	19	1	50.0	95.0
36	April 21	September 4	7	28	19	0	51	3	64.8	94.4
37	April 21	September 4	6	29	19	0	49	3	64.8	94.2
38	April 21	October 16	0	30	11	0	32	7	73.1	84.6
42	April 29	October 16	0	57	7	0	32	7	89.1	84.6
43	April 29	October 16	3	49	18	0	45	15	74.0	75.0
44	April 29	October 16	0	16	19	0	42	18	76.0	70.0
45	April 29	October 16	1	69	11	0	48	13	86.4	78.8
48	May 8	October 16	0	67	12	0	37	30	84.8	55.2
49	May 8	October 16	2	42	6	0	23	**14**	**88.0**	**62.1**
3	May 15	October 17	0	56	12	0	54	6	82.3	90.0
4	May 15	October 17	1	65	15	0	57	9	81.4	86.4
5	May 15	October 17	1	62	7	0	47	11	63.0	81.0
30	May 23	October 17	4	47	10	0	47	4	83.6	92.1
31	May 23	October 17	1	51	10	0	40	2	83.8	97.6
32	May 23	October 17	0	44	6	0	38	5	88.0	88.4
33	May 23	October 17	1	49	11	0	51	4	82.0	92.7

TABLE NO. 5.

Result of time of planting experiments for the control of the corn ear worm and the sugar cane moth borer.

Date Planted	Date Examined	Stalks With Borers Present	Stalks Showing Evidence of Borers	Borer Free Stalks	Ears Showing Earworm Injury	Ears Showing No Earworm Injury	% of Stalks Injured by Borer	% of Stalks Injured by Earworms
March 24....	August 14..	2	3	23	23	6	17.8	79.0
March 31....	August 14..	15	51	92	122	43	41.8	73.7
April 8.....	Sept. 4.....	3	3	12	19	1	50.0	95.0
April 21....	Sept. 4.....	13	87	49	132	13	67.5	91.1
April 29....	Oct. 16.....	4	235	55	167	53	81.4	77.1
May 8......	Oct. 16.....	2	109	18	60	44	86.4	58.6
May 15.....	Oct. 17.....	2	183	34	158	26	78.9	85.8
May 23.....	Oct. 17.....	6	191	37	176	15	84.4	92.7

DEPARTMENT OF PLANT PATHOLOGY.

C. W. EDGERTON, Pathologist.
E. C. TIMS, Assistant Pathologist.

During 1924, the work in the Department of Plant Pathology has followed closely that of preceding years. Most of the work was confined to a few projects, though some attention was paid to the general disease conditions about the state and to problems that required immediate attention. The projects receiving the most attention were the ones on sugar cane diseases, corn root rots and tomato wilt.

SUGAR CANE DISEASES.

During 1924, the sugar industry of Louisiana suffered more from the attack of diseases than it ever had in previous years. The state suffered from the severest drought ever known and this tended to increase the severity of some of the diseases, specially the root rot. As a result of the dry season and the attack of three diseases—the red rot, the root rot and the mosaic—the state produced the smallest sugar crop of many years. On account of this situation, the members of this Department spent a considerable portion of their time on the cane disease problems. Several surveys were made over the sugar belt and Bulletin No. 191 was published at the end of the year summarizing the situation.

The work of selecting strains tolerant to the mosaic, which had been in progress since 1920, was continued. In the fall of 1923, the selected strains were brought from Audubon Park to the new Station at Baton Rouge. Considering the dry season, these selected strains of D 74 and Purple grew remarkably well. These were again selected in the fall of 1924. About 1,000 feet of row of each of these were planted. These selections are showing a marked tolerance to the mosaic disease.

During the season, considerable attention was paid to the root rot disease. Hundreds of affected roots from various parts of the sugar belt were cultured in the laboratory. The roots showed a very heavy infection with various species of Rhizoctonia. Other root rotting organisms, including species of Pythium, were also found. Several series of experiments to test out the importance of these organisms were begun in the laboratory, greenhouse and field. A series of seed treatment tests, using various fungicides, was also started in the field at Baton Rouge.

On account of the interest in the sugar cane problems, the Station established a number of test fields in various parts of the sugar belt. On these fields this Department started seed selection and seed treatment work. On some of these fields as much as seven or eight acres of stool selected cane was planted.

CORN ROOT ROTS.

The corn root rot project is being carried on in cooperation with the Station Agronomist. During 1924, 180 ears of corn were carefully cultured and then planted by the ear to the row method. This is the fifth year of this work. No direct relation between the fungous infection in the seed and the yield has been observed. The data for the five years are now being compiled and will probably be published during the coming year when this project will be discontinued.

TOMATO WILT.

The tomato wilt project was confined to the growing of stock seed of the wilt-resistant selections which have been developed at this Station. These strains continue to give very good results throughout the state and also in many other regions where they have been tried.

CHANGES IN THE STAFF.

Mr. C. C. Moreland, who has been assistant pathologist for a number of years, was transferred to the Chemical laboratory.

Dr. E. C. Tims was appointed assistant pathologist August 1, 1924.

PUBLICATIONS DURING 1924.

Bulletin No. 190. Dry Rot in Buildings and Building Material. C. W. Edgerton.

Bulletin 191. The Sugar Cane Disease Situation in 1923 and 1924. C. W. Edgerton, W. G. Taggart and E. C. Tims.

Seed Selection of Cane. Am. Sug. Cane League Bulletin, Vol. 2, No. 23, pp. 4-5. C. W. Edgerton.

The Root Rot Problem. Am. Sugar Cane League Bulletin, Vol. 2, No. 24, pp. 5-6. C. W. Edgerton.

The Sugar Cane Disease Situation in Louisiana. Louisiana Planter and Sugar Manufacturer, Second Annual Review, pp. 82-83. C. W. Edgerton.

REPORT OF THE EXPERIMENT STATION CHEMICAL LABORATORY.

A. P. KERR, Chief Chemist.
W. P. DENSON, Assistant Chemist.
J. H. JOLLY, Assistant Chemist.
J. L. FARR, Assistant Chemist.
C. C. MORELAND, Microscopist.

During the year 1924 the Experiment Station Laboratory analyzed 1,695 fertilizer samples and 1,506 feed stuffs samples for the State Department of Agriculture. Most of these samples were above the guarantee.

A large number of soil samples that were taken from the plats at the Fruit and Truck Experiment Station, at Hammond, La., were analyzed; also soil samples taken from the Rice Experiment Station, at Crowley, La. These analyses will be of considerable value in experimental work at these Stations.

A number of analyses were made during the year for the Louisiana Live Stock Sanitary Board, for suspected poisons in feed stuffs, where animals had died under suspicious circumstances.

At the 1924 session of the Legislature an Act was passed regulating the sale of insecticides sold in the state and empowering the Commissioner of Agriculture to enforce the law, and to collect samples and requiring the Experiment Station Laboratory to make analyses.

This Laboratory has cooperated with the Department of Entomology, of the Experiment Stations, in making analyses of insecticides used in boll weevil control work.

DEPARTMENT OF HORTICULTURE.

G. L. TIEBOUT, Horticulturist (one-fourth time)

INTRODUCTORY.

Under the present arrangement the horticulturist devotes a minor portion of his time to popular investigational work correlated with extension activities that are being conducted by himself and two assistants. Greenhouse and field laboratory facilities are also furnished to other departments working with allied projects.

CERTIFIED TRIUMPH SEED IRISH POTATO STRAIN TEST WORK.

After showing that certified Triumph seed potatoes are vastly superior to uncertified seed over a period of comparative tests covering four years, it was decided to determine by subsequent tests which state or states of the seven or more producing certified seed is offering the best stock. With this in mind, Nebraska and Montana sent a sample of practically every lot of certified Triumphs that was produced in each state. These were planted under similar conditions and the following average yields were obtained, as well as disease readings made:

State	No. of Lots	Average Yield in Bushels per Acre			Total Yield	Average Percent Mosaic	Average Percent Spindle-Tuber
		1⅞ Inches and Above	1⅞ to 1½ Inches	1½ Inches and Below			
Nebraska	103	181.89	45.21	14.59	241.69	*11	*9
Montana	21	188.41	49.21	13.82	251.44	†8	†7

*109 lots. †24 lots.

In another plot certified Triumph seed potatoes from seven states were compared, with the following results:

State	No. of Lots	Average Yield in Bushels per Acre			Total Yield	Average Percent Mosaic	Average Percent Spindle-Tuber
		1⅞ Inches and Above	1⅞ to 1½ Inches	1½ Inches and Below			
Nebraska	98	169.00	40.88	9.50	219.38	†11	†9
Montana	24	161.72	37.53	7.94	207.19	6	4
Wyoming	10	134.53	35.44	7.36	177.33	15	6
Wisconsin	7	172.82	28.25	6.21	207.27	10	4
North Dakota	7	167.82	30.78	6.14	204.74	19	3
South Dakota	5	107.98	29.16	7.46	144.60	45	7
Minnesota	2	192.10	28.76	8.54	229.40	7	5

†116 lots.

It seems that the mosaic and spindle-tuber diseases are the greatest limiting factors in Triumph production in Louisiana. This past year was the first one in which spindle-tuber disease readings were made, and it appears that this disease will give as much or more concern than the mosaic disease.

The test work in this connection is the most extensive ever conducted in the United States. Last year certification specialists from seven different states and a representative from the United States Department of Agriculture visited these plots and some of them spent days in studying the tests so as to improve the quality of the seed potatoes that they expect to furnish this state.

According to Dr. Wm. Stuart, potato specialist of the United States Department of Agriculture, ''Louisiana is leading all of the other states in the number of experiments that are being conducted with certified Triumph potato seed.'' This work was the nucleus of Louisiana's Second Annual Potato Tour, which, according to the same authority, ''has brought about a better understanding between the grower of the North and the grower of the South; and there is every reason to believe that the seed certification work that is being undertaken will go forward even more rapidly than in the past.''

Largely as a result of the Triumph seed potato work, 22 cars of certified seed were purchased by Louisiana interests in 1922, 85 in 1923, and 255 in 1924. Most of this stock came from the State of Nebraska, which is among the leaders in the production of quantity as well as quality.

NORTH LOUISIANA EXPERIMENT STATION.

CALHOUN, LA.

SIDNEY STEWART, Superintendent.

Very little experimental work of value has been done at this Station the past season, due to the unusually dry weather, from May 31 to December 1. The latter part of April and up to the middle of May, was cold for that season of the year and retarded the growth of the crops that were in at that time. The last week of May was wet, and for fear the wet weather would continue, crops were worked too wet, which, followed by the drouth, proved disastrous. Corn was practically a failure, and cotton, in spite of the absence of boll weevil damage, did very little. No peas or velvet beans were produced. Two plots of Biloxi soy beans thrived through the drouth and produced 1,025 pounds of hay per acre in six-foot rows, between corn, the corn producing 3.8 bushels per acre.

During the summer all of the buildings have been painted and whitewashed and put in good repair generally. The Agricultural building has been recovered with galvanized sheet iron roofing, windows raised to standard heighth, and given two coats of good paint. The Superintendent's residence painted inside and outside, roof stained, as well as some remodeling inside. The Farm Manager's home painted and some repair work done. A new yard fence has been built and continued on to the road, past the dipping vat. Most of the summer months were spent in putting the buildings on the campus in good order.

During the early part of June an encampment of the boys' and girls' clubs in this district was held on the Experiment Station grounds. The dam to the small pond in the north pasture was repaired to provide a swimming pool. The old pond was cleared out later in the summer and is now full of water, the dam being repaired before any rain fell. Fish will be secured through the Conservation Commission for stocking the pond, which covers two acres.

Trees have been ordered for filling vacancies in the new orchard. Several trees died from the effects of the drouth. Pecan trees have also been ordered for filling old vacancies in that orchard. Very few of the pecan trees had any nuts on them and none, with the exception of the Moneymaker, matured first quality nuts.

Due to the general depression of the community, no fair was held here this year, but plans are being made to continue them again this fall. The field day meetings were held during the year, from March to November.

THREE-YEAR COMPOST ROTATION EXPERIMENT, PLOTS A, B AND C.

In this experiment, one-third of the area is planted to cotton, one-third to corn and peas and one-third to oats, followed by cowpeas.

During the period between 1889 and 1908, the east half of each plot received an application of compost, at the rate of 30 bushels per acre. Since 1908 the compost has been applied to the south half of each plot; therefore, one-fourth of each plot has received compost annually since 1889, one-fourth has received compost since 1908, one-fourth received compost until 1908 and one-fourth has never had compost.

This compost is made of green cottonseed, stable manure and acid phosphate.

Results for 1924 on these plots are as follows:

	SE¼ Fertilized With Compost Annually Since 1889	SW¼ Fertilized With Compost Annually Since 1908	NE¼ Fertilized Annually With Compost Until 1908	NW¼ Has Received No Compost Since Beginning of Experiment
Plot "A" Oats	2.24 tons hay per acre	1.46 tons hay per acre	1.92 tons hay per acre	1.18 tons hay per acre
Plot "B" Cotton	462.50 pounds per acre	368.00 pounds per acre	257.25 pounds per acre	190.25 pounds per acre
Plot "C" Corn	9.16 bushels per acre	7.76 bushels per acre	6.86 bushels per acre	2.42 bushels per acre

Due to the dry weather, no peas were planted following oats on plot A. Although planted in corn in plot C, all died before maturity.

COTTON FERTILIZATION EXPERIMENT, WITH AND WITHOUT DUSTING FOR WEEVIL CONTROL.

Plot No. 1, Experiment Field.

Fertilization Scheme:

Acid phosphate and nitrate of soda, ratio 2 to 1, and in amounts ranging from 300, 600 and 900 pounds per acre, on plats, as shown below, without potash.

Repeated as above, with muriate of potash, at rates of 25, 50 and 75 pounds per acre.

Weevil Control:

By regular dusting, after 10% infestation is reached, and applied to central half of entire area, leaving the end one-fourths as undusted check areas, on dusting.

Outside rows on each side (4 rows each) through length of field to serve as checks on fertilization.

Plats:

Plats consist of eight in number and consist of four rows, running full length of field. Rows 32 inches apart.

		Yields, Lbs. per Acre
Plat 1.	Unfertilized. Check	392.0
Plat 2.	Phos. 200 lbs., nitrate 100 lbs., per acre	510.0
Plat 3.	Phos. 400 lbs., nitrate 200 lbs., per acre	596.5
Plat 4.	Phos. 600 lbs., nitrate 300 lbs., per acre	606.5
Plat 5.	Phos. 200 lbs., nitrate 100 lbs., mur. potash 25 lbs., per acre	538.5
Plat 6.	Phos. 400 lbs., nitrate 200 lbs., mur. potash 50 lbs., per acre	606.5
Plat 7.	Phos. 600 lbs., nitrate 300 lbs., mur. potash 75 lbs., per acre	615.0
Plat 8.	Unfertilized. Check	524.5

Wanamaker-Cleveland and Big Boll cotton was planted May 3, two rows of each set plowed up and replanted May 20 and vacancies replanted May 28.

Picked September 23 and October 3.

COTTON VARIETY RESULTS.

Plot 6, Experiment Field.

Name	No. Bolls Per Pound	Yield Per Acre	Lint—Percent	Source of Seed
1. Salsbury	92	525.00	33.00	Delta & P. Land So., Scott, Miss.
2. Coker's Lightning Express	92	480.00	33.00	Pedigreed Seed Co., Hartsville, S. C.
3. Coker's Delta Type Webber	89	375.00	35.42	Pedigreed Seed Co., Hartsville, S. C.
4. Coker's Webber 49	96	337.50	29.00	Pedigreed Seed Co., Hartsville, S. C.
5. Coker's Cleveland	73	480.00	38.00	Pedigreed Seed Co., Hartsville, S. C.
6. Wanamaker Pedigreed Cleveland B. B.	68	577.50	38.00	Model Seed Farm, St. Matthews, S. C.
7. Improved Express 350	120	465.00	31.25	Holloman-White, Memphis, Tenn.
8. Delfos 6102	96	480.00	37.50	Holloman-White, Memphis, Tenn.
9. Delfos 631	86	465.00	35.00	Delta Experiment Station, Stoneville, Miss.
10. Delfos 6102	80	472.50	34.00	Delta Experiment Station, Stoneville, Miss.
11. Express 630	96	487.50	31.25	Delta Experiment Station, Stoneville, Miss.
12. Express 432-782	96	375.00	31.04	Delta Experiment Station, Stoneville, Miss.
13. Cook 588	82	502.50	28.75	R. E. Hudson, Auburn, Ala.
14. Cook 588	88	487.50	27.50	T. J. Whatley, Opelika, Ala.
15. Bank Account	105	457.50	34.00	H. G. Hastings Co., Atlanta, Ga.
16. Covington-Toole W. R.	100	532.50	30.00	W. F. Covington, Headland, Ala.
17. Piedmont Pedigreed Cleveland B. B.	84	555.00	38.00	Piedmont Pedigreed Seed Farm, Commerce.
18. Mexican Big Boll	80	510.00	33.33	North Carolina Experiment Station, Raleigh, N. C.
19. College No. 1	80	517.50	38.00	Southern College of Agriculture, Athens, Ga.
20. Tennessee Half and Half (Peddy's)	88	472.50	39.58	Baker Grocery Co., Arcadia, La.
21. Craighead Half and Half	85	562.50	42.91	Dr. C. C. Craighead, Athens, La.
22. Louisiana No. 1	110	442.50	32.25	State Experiment Station, Baton Rouge, La.
23. Louisiana Hybrid 143	104	472.50	29.75	State Experiment Station, Baton Rouge, La.
24. Alexander Wilt Resistant	101	457.50	31.00	State Experiment Station, Baton Rouge, La.
25. Wanamaker-Cleveland Big Boll	82	472.50	39.75	North Louisiana Experiment Station, Calhoun, La.

All of the above varieties of cotton were planted by May 13. Three hundred pounds of acid phosphate and 75 pounds of nitrate of soda were applied in drill ahead of planting, and 75 pounds of nitrate of soda as a side dressing at first cultivation.

Picked August 8 and September 30.

CORN VARIETY RESULTS.

Plot 7, Experiment Field.

Variety	Yield per Acre	Source of Seed
1. Strawberry	4.05	Ferguson Seed Farms, Sherman, Texas.
2. Surcropper	8.45	Ferguson Seed Farms, Sherman, Texas.
3. Yellow Dent	7.30	Ferguson Seed Farms, Sherman, Texas.
4. Squaw	5.35	Ferguson Seed Farms, Sherman, Texas.
5. Chisholm	7.34	Ferguson Seed Farms, Sherman, Texas.
6. Cocke's Prolific	5.25	Mississippi Experiment Station, A. and M. College, Miss.
7. Rogers	2.65	D. H. Wallace, Verda, La.
8. Mosby	4.85	Mississippi Experiment Station, A. and M. College, Miss.
9. Allen's Big Ear Prolific	5.95	Dr. L. C. Allen, Hoschton, Ga.
10. Sentell's White Dent	3.40	J. M. Sentell, Dixie, La.
11. Neal's Paymaster	9.45	W. H. Neal, Lebanon, Tenn.
12. Whatley's Prolific	5.30	Whatley Bros., Helena, Ga.
13. Calhoun Red Cob	4.20	R. L. Moore, Monroe, La.
14. Haile Calhoun Red Cob	5.90	North Louisiana Experiment Station, Calhoun, La.
15. Wiley Smith's Prolific	4.05	Wiley Smith, Calhoun, La.

Planted April 30. Fertilized with 200 pounds acid phosphate and 50 pounds nitrate of soda, applied in drill ahead of planting, and 50 pounds of nitrate of soda, applied as side dressing, last cultivation. It being very dry, no effects of the last application could be seen.

Harvested October 1.

DEMONSTRATION THREE-YEAR ROTATION FIELD.

Area No. 1.

Previous crop: Corn and cowpeas.

Present crop: Cotton.

Cost of Producing Crop:

	Total	Per Acre
Preparation and planting	$80.06	$5.72
Fertilizer	69.30	4.95
Cotton seed (21 bushels at $1.50)	31.50	2.25
Cultivation of crop	137.20	9.80
Harvesting (6223 lb. at $1.00)	62.23	4.44
Ginning, bagging and ties	30.11	2.15
Total cost of producing and harvesting crop	$ 410.40	$ 29.31
Value of 2240 lb. lint at 22 cents	$492.80	$35.20
Value of 3982 lb. seed at $32.00	63.72	4.55
Total value of crop	$ 556.52	$ 39.75
Less cost of production, etc	410.40	29.31
Net value of crop	$ 146.12	$ 10.44

The above cotton was planted at intervals, as the weather permitted, from April 24 to May 1. The extremely cool weather of about May 10 destroyed the stand of the earliest planting and made it necessary to plant over one-third of the area, increasing the cost of production and reducing the yield.

No poisoning for weevil control was necessary. The percentage of infestation ran as high as 17% about July 12, but as the next count showed such a marked decrease and as only one point showed much signs of weevils, no poisoning was done.

Cultivation was continued until August 5.

Harvested September 3-8, September 25-October 6.

DEMONSTRATION THREE-YEAR ROTATION FIELD.

Area No. 2.

Previous crop: Corn and velvet beans.

Present crop: Corn and soy beans.

Cost of Producing Crop:

	Total	Per Acre
Preparation and planting	$38.50	$3.50
Fertilizer	39.60	3.60
Seed (corn $4.50, beans $10.50)	15.00	1.36
Cultivation of crop	37.29	3.39
Cutting and shocking corn	24.00	2.18
Hauling and stacking in barn	22.00	2.00
Baling	16.72	1.52
Total cost of producing crop	$ 193.11	$ 17.55
Value of 7.53 tons baled stalks and corn at $20.00	$150.60	$13.69
Loss on corn crop	$ 42.51	$ 3.86

Corn planted April 8-9.

Harvested July 15-17.

Soy beans were planted in drill with corn at first cultivation. Due to the early drouth, very few beans lived and practically no beans matured.

DEMONSTRATION THREE-YEAR ROTATION FIELD.

Area No. 3.

(Sixteen acres.)

Previous crop: Cotton.

Present crop: Corn and velvet beans.

Cost of Producing Crop:

	Total	Per Acre
Preparation (including running new terraces and rebuilding old ones) and planting	$59.52	$3.72
Seed (corn $12.00, beans $7.00)	19.00	1.19
Fertilizer	61.70	3.86
Cultivation	77.28	4.83
Harvesting	22.75	1.42
Total cost of production	$ 240.25	$ 15.02
Yield (185.16 bushels at $1.30)	240.70	
Average yield per acre (11.57 bushels at $1.30)		15.04
Profit on corn crop	2.80	† .02

†Approximately.

Corn planted from April 14 to 19.

Harvested October 17 to 20.

Velvet beans were planted in corn middles from May 20 to May 30, as the weather permitted. The continual rains during this period interrupted the planting. A good stand was secured and worked out once, but all died during the extremely dry weather.

WEATHER REPORT, 1924, NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA.

Month	Max. Temperature	Min. Temperature	No. Days Rain	Amount of Rain, Inches
January	65	11	9	4.53
February	76	19	11	6.61
March	84	28	8	4.94
April	87	32	7	4.98
May	91	42	12	3.82
June	99	55	2	.46
July	*105	54	2	.05
August	†104	60	2	.26
September	101	52	3	1.53
October	98	31	0	.00
November	85	25	1	.02
December	83	11	8	3.57

*Two days.
†Four days.
Total rainfall for the year, 30.77 inches.

STATION NO. 4.

RICE EXPERIMENT STATION

CROWLEY, LA.

J. MITCHELL JENKINS,

Superintendent of the Station and Assistant Agronomist, Office of Cereal Investigations, Bureau Plant Industry, U. S. Department of Agriculture.

CLIMATIC OBSERVATIONS.

The residents of Southwestern Louisiana will long remember the year 1924, on account of the extremely dry weather that obtained from early April until the latter part of November. According to the Station records, the annual precipitation was less by 7.48 inches than was recorded for the year 1917, which was the driest of the fourteen years for which this Station has a record.

During the period from April 10 to November 20 there was no individual rain of one inch or over. No rain fell during October. This is the only month in which this has occurred during the fifteen years in which records have been kept at this Station. The total precipitation for the year was only 30.58 inches. This is 26.87 inches less than the average for the past fourteen years. Of the total for the year, 22.78 inches took place during the first four and the last two months of the year, and the remaining 7.80 inches was distributed over the remaining six months in which the greatest amount of precipitation is needed. The average for this period (May 1 to October 31) for the past fourteen years was 30.39 inches.

The first three months of the year were about normal as to precipitation, January having slightly over the average amount of rain. The mean temperature for the month of January was 10° F. lower than for the same period in 1923. The remaining months of the year had a mean temperature approaching very nearly that of the year previous. The extreme high and low temperatures were much greater than in 1923. The maximum temperature for the year was 101° F.; this took place August 25. On July 25 and August 24 the temperature reached 100° F. This is the first time we have recorded 100° F. The lowest temperature, 18° F., took place January 6, and many times during this month it was in the 20's and 30's.

LOSS OF LIVESTOCK FROM EXTREME WEATHER CONDITIONS.

The extreme weather during January caused a great loss of cattle, due to exposure and lack of food. There was little relief in this respect before rather late spring, as climatic conditions during February and March were severe and not conducive to the production of grass. In the main, cattle were deprived even of the pleasure of filling themselves with rice straw, this having been sold during the autumn and early winter.

During the summer cattle died in great numbers from anthrax. This was more severe than it had been in several years, due, no doubt, to the low vitality of the animals, and to neglect on the part of the owners to vaccinate.

Toward the end of the summer and during autumn, the scarcity of food and water, due to prolonged drouth, presented another problem to the cattle owner and caused great suffering among the animals.

EFFECT OF DROUTH ON SOURCES OF IRRIGATION.

Due to the continued drouth, early in July, water in practically all streams contained salt in varying quantities and many irrigation plants ceased operations when the amount of salt reached a point that was thought damaging, in hopes that rain would fall before the crop suffered for water. It was soon found that there was only one thing to do and that was to pump water as long as there was any in the streams. This resulted in varying yields from fair crops to total failures. The irrigation plants nearest the gulf closed down when there was no doubt that the water was injuring the crop. The deep wells were also affected by the decrease in the source of water, due to lack of rain over the state, and the continuous pumping necessary to keep the fields flooded. Repairs had to be made in most wells in order to keep up the flow of water.

The well on the Station, used for irrigation purposes, is 300 feet deep. Normally the water level is about 18 feet below the surface. The pump is placed at a point 30 feet below the surface, and will draw water from a depth 10 to 15 feet lower down. During early July the water in this well went so low that the pump could not lift it. After removing the pump, it was found that the water level had receded to a point about 50 feet below the surface. After extending the suction pipe of the pump and placing a valve, it was possible to obtain practically a normal flow of water during the remainder of the season. The water level had not risen as high as the pump as late as the end of December.

It was reported that the water level in some irrigation wells went as low as 70 feet, also in some rare cases wells failed to produce after every means of remedy had been tried.

The failure of the wells to produce normally, and the increased duty put upon them by the drouth, forced the abandonment of a large acreage of rice. Rather than attempt to irrigate the entire acreage seeded, farmers abandoned a portion, hardest to reach, and concentrated their efforts on a smaller area. In planning the acreage to be irrigated from one well, the normal rainfall is usually taken into account.

Some have estimated the loss of rice from damage by salt water, and from lack of water, as high as 75,000 acres in the three states of Louisiana, Texas and Arkansas. Where rice received a sufficient quantity of fresh water the yield was good. With high prices resulting from a reduced crop, many farmers made money, while others had no crop to sell.

RESULTS ON THE STATION.

The extreme weather conditions described above had no damaging effect on experimental work with rice. The cold weather in winter, uniform temperature and constant sunshine in summer seemed to have had a beneficial effect, for the yields of rice, as a whole, on the Station were larger than those of last year. This was especially true in the date of seeding experiments and in plats devoted to experiments with fertilizers.

The effect of fertilizers was more noticeable on land that has been devoted to rice continuously for six years than had been noted in the past. This, however, is not conclusive, in that there is an increase also in the yield from check plats; in some instances the yield from them is above that secured from fertilizers; also, in other tests, on land cropped to rice for the same length of time, the yields are larger than where fertilizers were applied.

The best results, in the date of seeding experiments, were secured from the April plantings with the May seedings taking second place. It seems that the early seedings, as a whole, in the case of certain rices, produced the best yields. This is no doubt due to seasonal climatic conditions. Certain rices do best under moderate rather than high temperature.

One outstanding feature in reviewing the results of the year is the effect of crop rotation on the yield of rice. Especially is this noticeable where the soybean enters into the rotation. The yields in many cases are far above anything secured from commercial fertilizer. Even where fertilizers were applied to land that had produced soybeans the year previous, the yields in many instances were less than on plats of similar treatment that contained no fertilizer. One plat of an acre, on the Station this year, that has been devoted to general non-irrigated crops for several years, and to Biloxi soybeans for the two years previous, produced a yield of twenty-four barrels of seed rice. No commercial fertilizer was used. While some increases have resulted this year from certain commercial fertilizers, there is no ground, based on the results at this Station, for expecting paying results from their use. On the other hand, everything points to the advantage, from several angles, of growing soybeans in rotation with rice, as a means of maintaining soil productivity and economical production.

The yield of soybean seed was greatly reduced by the excessively dry weather of the entire growing season. At seeding time, the dry condition of the soil reduced the stand, and the lack of sufficient moisture during the summer retarded the growth of the plants; however, in fields having a good uniform stand the yield was as high as ten bushels of excellent seed. In the past, the Biloxi soybean proved its resistance to excessive rain; this year, it has proven its resistance to excessive drouth. During the hot, dry weather this crop maintained a healthy appearance, never wilting during the hottest days.

The blister beetle was very persistent, and in some plats of Biloxi beans on the Station it caused considerable damage when the plants were 3 to 4 inches tall, by eating through the main stem. The scarcity of green vegetation, no doubt, caused this beetle to collect in great numbers on the soybean, which was usually the only green thing to be found.

EXTENSION OF STATION RECOMMENDATIONS.

Interest, by the farmers, and by those interested in the farmers, from a financial standpoint, increased wonderfully during the year in the growing of the Biloxi soybean in rotation with rice, and in the results secured at this Station with commercial fertilizers. The Station Superintendent and the Extension Specialist in Rice were invited to present these matters before a number of farmers' gatherings. Usually these meetings were devoted to a discussion of the value of the soybean and commercial fertilizers in a more or less comparative way. The Extension Specialist led the soybean discussion and the Station Superintendent presented the Station results with commercial fertilizers.

Some of the banking firms have manifested great interest in the soybean program projected at this Station during a farmers' meeting last year. One banking house purchased seed for its constituents on reasonable terms and provided soybean harvesters for their use. This company expects to extend its activities along this line another year.

The Extension Division of the University, through its Specialist in Rice, making his headquarters at this Station, has greatly extended interest in the soybean program throughout the rice territory, and in spite of the extreme conditions that obtained throughout the season, succeeded in establishing close to 100 demonstrations throughout the prairie rice section. The encouraging part of the whole matter is that interest has not lagged. The indications are that there will not be sufficient seed to meet the demands next spring.

PUBLICATIONS.

In February the Extension Division of the Louisiana State University published Extension Circular No. 67, entitled "The Biloxi Soybean," prepared by E. S. Landry, Specialist in Rice Production of the Extension Division, and J. Mitchell Jenkins, Superintendent of the Rice Experiment Station and Assistant Agronomist, Office of Cereal Investigations, Bureau of Plant Industry. This circular includes a discussion of the value of the Biloxi soybean when grown in a rotation with rice, and the method of culture under rice field conditions, all of which is based on work done at this Station.

ENTOMOLOGICAL WORK.

Entomological work, carried on at this Station by the Bureau of Entomology of the United States Department of Agriculture during the past year, consisted mainly in making of observations on rice insects to determine their manner of passing the winter; and the nature of their winter quarters, with a view of devising some means of reducing the number of injurious insects that successfully pass through the winter. The life history of the rice stink bug (Solubea pugnax) was worked out; and investigations were made pertaining to the life history of the rice water weevil (Lissorhoptrus simplex) and the two stalk borers (Diatraea saccharalis and Chilo plejadellus). Field observations were made during the growing season to determine the extent of the damage done to the rice crop by the injurious insects. Special work was carried on to determine the loss due to the rice water weevil.

MALARIA INVESTIGATIONS.

The unit of the United States Public Health Service, investigating malaria under rice field conditions, continued its headquarters and laboratory at this Station throughout the year.

STATION NO. 5.

FRUIT AND TRUCK EXPERIMENT STATION.

Hammond, La.

B. SZYMONIAK, Horticulturist in Charge.

The following list of projects were carried on during the year 1924:

Fertilizers for strawberries.
Varieties of strawberries.
Muscadine grape culture.
Blackberry culture.
Crop rotation.
Satsuma orange culture.
Reforestation of cut-over land.

A new project has been added during 1924 which has for its object to determine the value of large and small seed for producing stocks for propagating the pecan. The seed was furnished by the United States Department of Agriculture, at Washington, D. C., and planted February 23, in rows 7 feet apart and about 250 feet long, there being 30 rows in all. The pecan seed germinated satisfactorily, but made only an average of about six inches in growth during the whole year on account of the severe drought.

The climatic conditions during the year have been very extreme. During the first week in January the temperature here was 15° F. above zero, on the 5th, and continued below freezing for two or three days, doing much damage to the Satsuma oranges and the strawberry crop. The months from June to December were extremely dry, so much so that where irrigation was not done the strawberry plants suffered badly and in a good many instances died out completely.

Fertilizers for strawberries was continued, as in 1923, with the same fertilizer combinations, 1924 being the second year that these combinations were tried, with the following result: A combination of 360 pounds of 16% acid phosphate, 120 pounds of 14.8% nitrate of soda, and 45 pounds of 50% sulphate of potash gave the highest average yield per acre of 61 crates, as compared with 24 crates per acre where no fertilizer was applied. The low yield is due to injury by a severe freeze in January and drought during the bearing period of the plants.

Varieties of strawberries included the same ten varieties that were planted in 1923, and again the Nick Ohmer was the earliest to come into bearing and gave the highest yields, producing twice as many berries as the Klondyke, but it has not been as satisfactory for shipping as the other varieties, and is therefore not a strawberry for commercial planting.

Muscadine grape culture is progressing satisfactorily. The vines made a good growth in spite of the dry weather. The plants being young, no yields were produced. There are ten new varieties that are included in this project and that were originated by the United States Department of Agriculture Specialist. All of them, even though planted on a light sandy loam soil, have withstood the drought remarkably.

Blackberry culture has not given satisfactory results, due to the dry weather during harvest time. The varieties of MacDonald and Lucretia set a heavy crop, but failed to mature a good crop. Only 20 crates of fruit were harvested from about two acres.

Crop rotation has been in suspense because it was difficult to determine which crops would fit in best with the strawberry crop. The following plan has worked to advantage in the past two years: First year, strawberries; second year, Biloxi soybeans; third year, corn and cowpeas. The soybeans are cut for hay and cowpeas are plowed under for humus. Rust-proof oats are sown for winter cover crop.

Satsuma orange culture resulted in a more or less complete failure. Of the 100 trees planted, only ten survived the 15 degrees above zero weather. They have been well taken care of—that is, cultivated and fertilized—but the warm weather the previous month of December caused growth to start, which was too tender to withstand the cold weather in January. We are going to plant 100 more trees in 1925, with the hope that we will not experience such extreme conditions of weather in the near future.

Besides carrying on the above projects, we have made needed improvements, the most important items of which were: (1) A new general utility barn, planned by the Farm Mechanics Department of Louisiana State University; (2) two houses for laborers, built at a cost of $2,000; (3) a small packing shed for packing strawberries; (4) an entrance road graded and graveled to the residence; (5) a driveway entrance of concrete pillars, and cattle guard for autos and wagons.

There are about 50 acres under cultivation and fenced in. The rest of the 183.3 acres is not fenced in but is growing in pine trees; thirty acres are protected by a strip of plowed land to keep out the fires. This thirty acres of pine trees comprises our Forestry Project. The protection given this piece of land against fire in the last two years has given good results. The land is covered with pine trees, 3 to 5 feet tall, while the land swept by fire in the vicinity is barren.

Good care has been given the home orchard and the poultry and mules on the place. About 150 bushels of corn were raised and about twenty tons of soybean and cowpea hay produced. Fourteen varieties of soybeans were planted, but on account of the dry weather these have not been given a fair test.

A good deal of interest was shown by the people in this section and groups of farmers from other sections. Farmers from Mississippi and Alabama have come to visit our Station farm. We are proud to say that we get splendid cooperation from the business people, Chamber of Commerce and Rotary Club of Hammond.

In spite of the prevailing dry weather during the greater part of the year, we have produced enough plants for our use, setting out about 50,000 to carry on the fertilizer test for strawberries. This was done without irrigation. It was necessary to keep cultivating throughout the dry spells to keep the plants alive. We had another drawback to contend with, and that was the grub worm. This worm ate the roots of the strawberry plants and it is supposed that, owing to the scarcity of moisture, the natural feeding plants of this insect were lacking.

EXPERIMENT STATION PUBLICATIONS.

Bulletin 190—"Dry Rot in Buildings and Building Material," C. W. Edgerton.

Bulletin 191—"The Sugar Cane Disease Situation in 1923 and 1924," C. W. Edgerton, W. G. Taggart, and E. C. Tims.

Bulletin 192—"Sugar Beets in Louisiana," A. F. Kidder and C. E. Coates.

Annual Report for 1923, W. R. Dodson, Director.

CHANGES IN STAFF.

Thos. H. Jones, Entomologist, resigned January, 1924. Dr W. E. Hinds, formerly Entomologist at Alabama Polytechnic Institute, Auburn, Ala., was appointed April 1, 1924, to succeed Mr. Jones.

Dr. E. C. Tims was appointed September 1, 1924, as Assistant Plant Pathologist. Mr. C. C. Moreland, formerly Assistant Plant Pathologist, was transferred to the Fertilizer and Feed Stuffs Laboratory, as Microscopist.

Rogers Dodson was appointed June 15, 1924, as Specialist in Forage Crops.

FINANCIAL REPORT OF THE LOUISIANA AGRICULTURAL EXPERIMENT STATIONS FOR THE YEAR 1924.

	Hatch Fund	Adams Fund	State Fund	Fertilizer and Feed Fund	Total
Dr.					
Balance January 1, 1924	$	$ 836.78	$ 783.53	$ 3,262.52	$ 4,882.83
From Treasurer of the United States	15,000.00	15,000.00			30,000.00
State appropriation			40,000.00		40,000.00
Sales			17,440.98		17,440.98
Refunds			1,396.51	206.80	1,603.31
Interest on deposits			104.59		104.59
From Commissioner of Agriculture				34,124.40	34,124.40
Transferred from Fertilizer and Feed Stuff Fund			8,000.00		8,000.00
Total receipts	$ 15,000.00	$ 15,836.78	$ 67,725.61	$ 37,593.72	$ 136,156.11
Overdrafts, December 31, 1924	551.35	148.22			699.57
Total	$ 15,551.35	$ 15,985.00	$ 67,725.61	$ 37,593.72	$ 136,855.68
Cr.					
Salaries	$ 7,030.35	$ 12,943.68	$ 22,054.65	$ 17,882.70	$ 59,911.38
Labor	2,762.34	971.36	17,465.99	1,987.14	23,186.84
Stationery and office supplies	154.06	3.03	344.12	270.61	771.82
Scientific supplies	32.00	307.05	150.15	1,881.00	2,370.20
Feed stuffs	568.20	189.95	1,184.45		1,942.60
Sundry supplies	1,593.52	139.46	1,784.83	337.69	3,855.50
Fertilizer	85.87		1,281.83		1,367.70
Communication service	44.93	41.20	518.98	148.50	753.61
Travel expense	456.47	74.37	2,629.98	322.98	3,483.80
Transportation of things	156.69	20.98	595.55	137.21	910.43
Publications	276.66		146.80	639.50	1,062.96
Heat, light, water and power	51.24	200.53	942.96	519.01	1,713.73

Furniture and Fixtures	80.50	54.50	179.92	534.50	849.92
Library	97.74	84.29	84.86	63.75	330.64
Scientific equipment		908.25	291.42	196.63	1,396.30
Live stock			1,042.00		1,042.00
Tools, implements and machinery	1,158.16	46.35	1,953.79	72.17	3,230.47
Buildings and land	86.64		10,591.01	49.25	10,726.90
Contingent expenses	5.09		1,299.90	193.07	1,498.06
Transferred to State Fund				8,000.00	8,000.00
Loan refunded to bank			2,000.00		2,000.00
Total expenditures	$ 14,640.46	$ 15,985.00	$ 66,543.19	$ 33,235.71	$ 130,404.36
Overdraft, January 1, 1924	910.89				910.89
Balance, December 31, 1924			1,182.41	4,358.02	5,540.43
Grand total	$ 15,551.35	$ 15,985.00	$ 67,725.60	$ 37,593.73	$ 136,855.68

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ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

For 1925

TO THE GOVERNOR

BY
W. R. DODSON, DIRECTOR

EXPERIMENT STATION STAFF.

W. R. DODSON, A. B., B. S., Director.
W. G. TAGGART, B. S., Assistant Director.
C. W. EDGERTON, Ph. D., Plant Pathologist.
EUGENE C. TIMS, Ph. D., Assistant Plant Pathologist.
E. V. ABBOTT, Ph. D., Assistant Plant Pathologist.
HARRY MORRIS, D. V. M., Bacteriologist and Veterinarian.
W. E. HINDS, Ph. D., Entomologist.
HERBERT SPENCER, Ph. D., Assistant Entomologist.
G. L. TIEBOUT, B. S., Horticulturist.
J. F. BREWSTER, Ph. D., Research Chemist.
WM. L. OWEN, B. S., Research Bacteriologist.
JANE E. DALE, Ph. D., Research Chemist in Nutrition.
D. N. BARROW, B. S., Sugar Cane Specialist.
J. J. MUNSON, B. S., Sugar Engineering.
A. F. KIDDER, B. S., Agronomist.
A. P. KERR, M. S., Chief Chemist.
W. P. DENSON, B. S., Assistant Chemist.
C. C. MORELAND, B. S., Assistant Chemist.
J. H. JOLLY, B. S., Assistant Chemist.
JESSE L. FARR, M. S., Assistant Chemist.
C. R. HUMMEL, B. S., Custodian.
MRS. RUTH HEIDELBERG, Secretary to Director.
J. K. McHUGH, Librarian.
MRS. M. A. CARLETON, Student Assistant to Librarian.
B. H. THIBODEAUX, Student Assistant, Research Laboratory.
SHELBY JACKSON, Student Assistant in Entomology.
OTIS BROUSSARD, Student Assistant in Fertilizer and Feed Stuffs Laboratory.
D. J. DE ARENSBOURG, Farm Overseer.

North Louisiana Experiment Station, Calhoun.

SIDNEY STEWART, B. S., Superintendent.

Rice Experiment Station, Crowley.

J. MITCHELL JENKINS, B. S., Superintendent.
HELEN ANDRUS, Stenographer.

Fruit and Truck Experiment Station, Hammond.

B. SZYMONIAK, B. S., Horticulturist in Charge.

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE

BATON ROUGE, LA.,

To His Excellency, Henry L. Fuqua,
Governor of Louisiana,
Baton Rouge, La.

MY DEAR SIR:

I submit herewith, the Annual Report of the Agricultural Experiment Stations of Louisiana State University and Agricultural and Mechanical College, for the year 1925.

I am including also the financial statement of receipts and expenditures under all funds, the Hatch Fund, Adams Fund, and Purnell Fund from the Federal Government; the State appropriation to the Experiment Station, and all other revenues received and disbursed by me as Director of Experiment Stations for the calendar year, 1925.

As required by Act of Congress of March 2, 1887, (Hatch Act) and March 2, 1906 (Adams Act) a financial statement of these two funds is submitted, for the fiscal year, beginning July 1, 1924, and ending June 30, 1925.

Very respectfully,
W. R. DODSON,
Dean and Director.

WRD:H

MISCELLANEOUS

The Director of Experiment Stations has continued to serve as Chairman of the Cotton Production Council of the Association of Southern Agricultural Workers, in tabulating results of boll weevil experiments in the several states. He was chairman during the past three years, of a Special Committee of the Association of Land Grant Colleges, to carry on educational work in behalf of the Purnell Bill, for increasing the Federal Appropriations for Experiment Station work. The Purnell Bill was passed by Congress in February, 1925, and became effective July 1st, 1925.

The Director also has continued to serve on the Advisory Council of three, of the Agricultural Commission of the American Bankers Association. Numerous other activities in the general interest of agriculture, have each taken a part of the time of the Director of Experiment Stations.

A series of field meetings of sugar planters was held at the Sugar Station during July, at which time approximately a thousand visitors were in attendance.

A bankers meeting was held on the Experiment Station plots, with about twenty banks directly interested in sugar cane sending representatives.

A general field meeting was held at the Sugar Station in October, with an attendance of about one hundred.

FINANCIAL REPORT OF THE LOUISIANA AGRICULTUR AL EXPERIMENT STATIONS
YEAR 1925.

	Hatch Fund	Adams Fund	State Fund	Purnell Fund	Fertilizer Feed Fund	TOTAL
DR.						
Balance, January 1, 1925			$ 1,182.42		$ 4,358.01	$ 5,540.43
U. S. Treasurer	$ 15,000.00	$ 15,000.00		$ 10,000.00		40,000.00
State Appropriation			39,999.98			39,999.98
Refunds			7,588.65		433.45	8,022.10
Interest, Daily Balances			298.68			298.68
Transfer from Fertilizer Fund			13,500.00			13,500.00
*Loan, Bank of Baton Rouge			6,000.00			6,000.00
Sales			6,098.74			6,098.74
Baker Chemical Company			300.00			300.00
Commissioner of Agriculture					30,191.27	30,191.27
Total Receipts	$ 15,000.00	$ 15,000.00	$ 74,968.47	$ 10,000.00	$ 34,982.73	$149,951.20
Overdrafts, December 31, 1925	2,944.42				367.13	3,311.55
Grand Total	$ 17,944.42	$ 15,000.00	$ 74,968.47	$ 10,000.00	$ 35,349.86	$153,262.75
CR.						
Salaries	$ 7,179.20	$ 11,994.99	$ 18,866.28	$ 5,241.29	$ 16,070.72	$ 59,352.48
Labor	5,023.26	843.06	22,164.52		1,915.25	29,946.09
Stationery and Office Supplies	30.67	3.00	40.47		178.05	252.19
Scientific Supplies	303.73	107.82	138.87	244.26	1,169.91	1,964.59
Feed Stuffs	35.50	13.45	747.05			796.00
Sundry Supplies	616.50	118.25	1,902.17	1.60	145.85	2,784.37
Fertilizer	714.27		861.63			1,575.90
Communication Service	75.47	50.55	405.44	2.00	258.02	791.48

FINANCIAL REPORT OF THE LOUISIANA AGRICULTURAL EXPERIMENT STATIONS
YEAR 1925.—(Continued)

	Hatch Fund	Adams Fund	State Fund	Purnell Fund	Fertilizer Feed Fund	TOTAL
Travel Expenses	339.82	349.66	3,215.61	582.69	474.26	4,962.04
Transportation	99.15	16.30	1,106.85	45.51	130.36	1,398.17
Publications	4.50	....	550.58	....	....	555.08
Heat, Light, Water, Power	29.85	33.64	931.34	....	646.48	1,641.31
Furniture and Fixtures	308.98	1.50	157.85	16.00	106.78	591.11
Library	21.20	26.64	77.10	....	43.87	168.81
Scientific Equipment	35.85	481.39	42.59	....	177.02	736.85
Livestock	848.00	30.00	665.00	....	....	1,543.00
Tools, Implements and Machinery	1,169.65	1.50	3,766.90	1,191.90	12.30	6,142.25
Building and Land	431.47	16.05	15,404.57	....	359.19	16,211.28
Contingent	126.00	....	1,290.46	....	161.80	1,578.26
†Refund to Bank of Baton Rouge	....	....	2,000.00	....	....	2,000.00
Total Expenditures	$ 17,393.07	$ 14,087.80	$ 74,335.28	$ 7,325.25	$ 21,849.86	$134,991.26
Transfer to State Fund	....	....	....	....	13,500.00	13,500.00
Total Expense and Transfer	$ 17,393.07	$ 14,087.80	$ 74,335.28	$ 7,325.25	$ 35,349.86	$148,491.26
Overdraft, January 1, 1925	551.35	148.22	....	....	....	699.57
Total	$ 17,944.42	$ 14,236.02	$ 74,335.28	$ 7,325.25	$ 35,349.86	$149,190.83
Balance, December 31, 1925	....	763.98	633.19	2,674.75	....	4,071.92
Grand Total	$ 17,944.42	$115,000.00	$ 74,968.47	$ 10,000.00	$ 35,349.86	$153,262.75

*Amount borrowed before appropriation was available.

†Partial refund of amount borrowed from Bank.

SUPPLEMENTARY STATEMENT.

Hatch and Adams Funds.

For Fiscal Year, Ended June 30, 1925.

	Hatch Fund	Adams Fund
Dr.		
Received from the Treasurer of the United States, as per appropriation for fiscal year, ended June 30, 1925, under Acts of Congress, approved March 2, 1887 (Hatch Fund) and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
Salaries	7,496.95	12,606.20
Labor	2,536.28	1,008.77
Stationery and Office Supplies	6.35	6.03
Scientific Supplies, consumable		134.37
Feeding Stuffs	521.85	64.35
Sundry Supplies	796.56	132.64
Fertilizers	741.97	
Communication Service	49.57	70.13
Travel Expense	282.50	106.89
Transportation of things	177.70	10.88
Publications	4.50	
Heat, Light, Water and Power	98.94	74.09
Furniture, Furnishings and Fixtures	55.75	6.00
Library	78.35	48.49
Scientific Equipment		679.06
Livestock	728.00	30.00
Tools, Machinery and Appliances	1,055.09	7.10
Buildings and Land	243.64	15.00
Contingent Expenses	126.00	
	$15,000.00	$15,000.00

DEPARTMENT OF AGRONOMY.

A. F. KIDDER, Agronomist.
H. F. STONEBERG, Assistant (Detailed by Office of Cereal Investigations, Bureau of Plant Industry, U. S. Dept. Agr.)

The work of this Department was moved from the old Station to the site of the University during the early part of the year. All old plats were abandoned and new ones were laid out on the new area. A small portion of the work is duplicated on the alluvial land.

SOIL FERTILITY.

TWO-YEAR ROTATION.

Six acres of fairly uniform upland were divided into 120 one-thirtieth acre plats; two series of 60 plats each. The two year rotation of cotton and legume is planted on these series of plats. Oats are sown over the entire area in the fall and plowed under during February of each year. One-half of each series is planted to cotton and the other half to corn and legume each year. The fertilizer results are duplicated once.

Nitrate of soda, acid phosphate and kainit are the fertilizing materials used. Varying combinations of these materials are applied to the cotton while nothing is added to the corn. The residual effect of the fertilizers applied to the cotton will be noted in corn yields. This was the first year for this project.

THREE-YEAR ROTATION.

A three-year rotation of cotton, corn and legume and soybeans occupies a four and a half acre area. There are 72 one-twenty-sixth acre plats, 24 planted to each crop every year. Oats are sown after cotton and corn and plowed under early in the spring.

One, two, and three tons of finely ground oyster shells are applied with varying amounts of nitrate of soda, acid phosphate and kainit to the cotton. The residual effect of the fertilizers will be noted in the corn and soybeans. This was the first year for this project.

NITRATE OF SODA AND COTTON.

A study of the varying amounts of nitrate of soda as a top dressing to cotton is another new project. Fifty to two hundred and fifty pounds of nitrate of soda are used. Three hundred pounds of acid phosphate and one hundred pounds of kainit are applied to all plats before planting. This, as well as other soil fertility projects, will be continued.

CORN VARIETIES.

Twelve varieties of corn were planted this year on both upland and alluvial land. The hill check system was used with the White Calhoun as the check variety. As noted in previous years, the prolific varieties were the heaviest producers. Cock's Prolific seems to be outstanding. There was considerable variation as to suckers and barren stalks among the different varieties. Those producing the highest yields had the smallest per cent of barren stalks and other deleterious characters.

OAT VARIETIES.

Four varieties of oats were planted. The Patterson and Ferguson No. 71 were the best in yield. There is very little difference in the growth of the various rust resistant varieties of oats. Farmers, however, are strongly urged to buy Louisiana grown seed oats. Fields planted to seed obtained from other sections in the South have been inspected and a number of types of oats have been found. The yield of such fields has been low.

COTTON VARIETIES.

Forty different strains and varieties of cotton were planted this season. Half and Half was one of the lowest producers, with short, stiff and coarse lint. This variety is not recommended for any section. Dixie-Triumph, Cleveland, and Mexican Big Boll are the leading short staple varieties this season. Lone Star 65 was quite promising; Lightning Express and Delfos 6102 were the best long-staple cottons.

SUGAR BEET VARIETIES.

Eight different varieties were planted. Several new ones were added, while some that had not given very good results were not included. Adverse weather conditions prevented planting until February, 1925. The dry weather of early spring reduced the yield very perceptibly on the upland but did not seem to affect the lowland planting. It did cause a very high sucrose content which was decreased by several per cent as soon as the wet weather of June began. The results are very similar to those published in Bulletin No. 192.

SOYBEAN VARIETIES.

Thirteen different varieties of soybeans were planted on both alluvial and upland. Yields of hay were obtained. The beans produced practically no seed. Hot and humid weather during the blooming period prevented pollination. This same condition occurred in 1921. Late planting in this latitude is the only sure method of producing a soybean seed crop; this will reduce the yield.

A manuscript on soybean varieties was prepared and presented to the Director of the Experiment Stations; it has not yet been published.

LESPEDEZA.

The plantings of Kobe and native Lespedeza were practically a failure, due to the dry weather of early spring. Sufficient seed was produced by both varieties, however, to give a fair crop in 1926. The Kobe variety seems to be very promising. Its greater growth produces a higher yield of hay without decreasing the quality.

PLANT BREEDING.

COTTON.

The best strains of Louisiana No. 19 bagged and open pollinated seed were planted. Fair yields were obtained. The lint was shorter than usual, probably due to adverse weather conditions. Several strains have been selected for planting on a larger area in 1926. Long lint, high per cent of lint and open type plant are main characters sought.

OATS.

The strains of oats were planted in rod rows, December, 1924. These strains are practically pure lines. Yields were extremely good, many of them producing ninety bushels per acre. The best strains were selected and planted in 1/10 acre plats for further testing. Other promising strains were continued in rod row beds. A few strains were distributed over the State.

SOYBEANS.

A few promising field hybrids were selected several years ago. One which is probably a cross between the Otootan and the Biloxi appears to be quite promising.

CORN.

Intensive corn breeding investigations in cooperation with the office of Cereal Investigations, United States Department of Agriculture, were continued along the same lines as during the preceding two years.

The State carried the overhead expense on this project, furnishing the land, fertilizers and common labor. The Office of Cereal Investigations carried the other expenses, a full time Agronomist and supplies. H. F. Stoneberg has conducted this work.

In all commercial open-fertilized varieties of corn, various deleterious characters are present, which tend to reduce production. Among these injurious characters are barrenness, weak stalks, weak roots, twisted and crinkled leaves, deficient chlorophyll, short and loose husks, and susceptibility to different diseases and insect pests, which reduce the stands, yields and keeping quality of open fertilized corn. In the investigation by self-pollination, strains free from these harmful factors have been isolated by continued selection. The re-combination of these pure strains, after eliminating undesirable characters, is necessary to restore vigor and high production. The hybrids from some of the re-combinations of these strains, possessing desirable characters among which are long and tight husks extending beyond the tip of the ear, when grown in the field in comparison with the best commercial varieties, have already produced substantial increases in yield and have shown resistance to ear-worm attack and to weevil damage before and after storage.

PUBLICATION.

Report of Cotton Variety Tests. (Mimeograph.)

Fungus Infection of Seed Corn Kernels and the Importance of Germination Tests. C. W. Edgerton and A. F. Kidder, Louisiana Bulletin No. 193.

DEPARTMENT OF ANIMAL PATHOLOGY.

HARRY MORRIS, Bacteriologist.

During the year 1925, the work in the Department of Animal Pathology was continued under the same plan as in preceding year. The major part of the time was devoted to teaching Veterinary Science and to the care of the live stock on the College farm, while the minor portion was given to Station work.

ANTHRAX.

The anthrax project was continued. A study of the life history of anthrax spores in soil, under various conditions of temperature and moisture, which has been in progress for several years, was continued. Some interesting results have been obtained from a series of experiments, in which various plants were grown in soil inoculated with anthrax spores. After the plants had grown to a certain height, they were examined for the presence of anthrax spores. Anthrax cultures have been recovered from plants resulting from seeds and cuttings planted in inoculated soils. This work will be published in the near future.

The custom of annually vaccinating all of the College livestock with anti-anthrax serum and spore virus, was continued and another year passed without the loss of a single animal from the disease.

During the summer of 1924, Louisiana experienced one of the most extensive outbreaks of anthrax in the history of the State. A great many blood smears were received at the laboratory, for examination. While in 1925, very few local outbreaks of the disease appeared in the State, and only one positive diagnosis of anthrax was made in the laboratory during the year. This is the lowest number ever recorded since the establishment of the laboratory.

The announcement of the death of Dr. W. H. Dalrymple has been given in the preceding report, by Director Dodson. This report, however, would be incomplete without some tribute to his life and work in the Experiment Station.

Dr. Dalrymple was one of the greatest exponents of disease prevention and control, through the enforcement of the laws of sanitation and preventive inoculations. His weekly articles to the press on the subject of livestock sanitation, were read by many people. He knew that his ideas concerning disease prevention were sound and could be practiced in this state with a fair degree of success, because they had been followed, as far as possible, in caring for the health of the University livestock, especially the dairy herd. Until the University was moved to the present location, the equipment was about the same as that found on any good farm. The following is a short summary of the results obtained:

Covering a period of fifteen years, there have been three cases of anthrax among the livestock. One animal was brought on to the farm inoculated with the disease. There has been one case of blackleg among the calves. During this period of time, six animals in the dairy herd reacted to the tuberculin test. Four of these reactors were imported onto the farm but were removed before much harm was done to the healthy herd.

The most serious outbreak of any infectious disease occurred in the dairy herd during 1919, when the calf crop was lost from infectious abortion. We have demonstrated that this disease can be controlled by the observance of sanitary measures.

Four cases of actinomycosis, or "lumpy jaw" have developed, but they responded to treatment without loss to the herd. A few cases of hemorrhagic septicemia have occurred in the calf herd.

During the past fifteen years, white scours has not appeared among the calves. Texas fever has been held in check for many years.

Dr. Dalrymple was very proud of the fact that his teachings concerning disease prevention and control, through the practice of sanitation and preventive inoculations would give fair results if properly executed.

DEPARTMENT OF BACTERIOLOGY.

W. L. OWEN, Bacteriologist.

The work of this department for the past year, has proceeded in four definite phases, viz,

1. Research Laboratory Investigations.
2. Preparations for the evacuation of the Station at Audubon Park.
3. Assembling the equipment in the new quarters.
4. Resumption of laboratory investigations at the new University.

The first phase of the work proceeded until the middle of June, when preparations were begun for terminating the investigations to write up the results in bulletin form. Actual work of crating, packing and shipping laboratory equipment and supplies was under way by the latter part of July, and early in the month of September the Station building at Audubon Park was turned over to the park authorities, and the new quarters at Baton Rouge were occupied in the latter part of the month.

Owing to the fact that the new chemical building was still incomplete, it was not until the early part of November that laboratory work was practicable in our new quarters. The work of shipping the equipment and supplies from the old to the new site proceeded without any interruption, and the laboratory equipment came through with a minimum amount of breakage or damage. The new quarters occupied by the Department are excellent in every respect, and the prospects for the progress of the investigations under the greatly superior facilities offered by the modern building and its unexcelled equipment, are most promising.

RESULTS OF RESEARCH INVESTIGATIONS.

The investigation of the Protective Process for the prevention of sugar deterioration was carried out without interruption during the first six months of the year. The results from an extensive series of experiments carried out showed that when properly applied, a protective film of inoculated molasses, very effectively suppressed all deteriorative changes induced by microorganisms. A large number of raw sugars were filmed with inoculated molasses containing varying numbers of torulae, and varying percentages of CO_2, and the effectiveness of the treatment observed. Especial attention was given to the consideration of the number of torulae required for the protection of sugars of different "Factor of Safety" and also the concentration of CO_2 required to afford initial protection against the action of mold fungi. A CO_2 content of .036% was found to be sufficient to prevent the inversion of sucrose in the molasses films of sugars by the mold fungi. The value of the initial and final increases in polarizations of sugars treated according to this method averaged $2.50 and $5.94 respectively per ton of sugar treated.

The cost of applying the process should be more than equalized by the increases in initial value resulting from the increases in polarization.

The experiments on this phase of the problem of sugar deterioration showed that not only do the treated sugars increase in polarization during storage, but owing to their loss of levulose, are much less hygroscopic and tend to lose moisture under conditions where the untreated samples would actually absorb it. The treated sugars are also lighter in color, due partly to the loss of levulose and partly to the entrained CO_2 in their films.

PUBLICATIONS.

The results of the investigations on this phase of sugar deterioration were prepared for publication in the early part of June and submitted, with a view of having it published as a Station bulletin. However, owing to the fact that the department was already contributing a series of articles dealing with the economic phases of the problem of sugar deterioration, and including the data from all of the various publications on the subject, it was decided to also include in this series these latest results of our investigation. The series of articles embrace ten chapters appearing in numbers VIII to XX of "Facts About Sugar."

NEW PROBLEMS FOR INVESTIGATION.

The change of location of the Station, from Audubon Park to Baton Rouge, coincides with a change of projects for this Department. Up to this time problems of biochemical changes in sugars and sugar house products, and studies of types of fermentation of syrups and molasses, have occupied our exclusive attention. From now on, the Department will include soil problems in its program of investigation. Two such problems are already outlined and actual preliminary work is already under way on both of them.

The first of these problems is a study of the effect of cane trash upon the nitrogen of the soil, with particular reference to the stimulating effect it may have upon denitrifying bacteria. Work on this problem is already under way on both of them.

The first of these problems is a study of the effect of cane trash upon the nitrogen of the soil, with particular

reference to the stimulating effect it may have upon denitrifying bacteria. Work on this problem is already under way, and experiments have already been initiated, the results of which should throw some light upon this subject.

Concurrently with the work on this project, studies are already in progress on the qualitative and quantitative bacteriological flora of our Experiment Station soils. A comparative study of various culture media for soil studies is also in progress.

EXPERIMENTS WITH ADCO MANURE.

In cooperation with the Assistant Director, experiments upon the preparation of manure from rice straw, by the use of the leading material called "ADCO," furnished us by the Agricultural Development Company, of Harpenden, England, are already in progress. These results should be of very great interest, since they may lead to a more efficient and profitable use of our crop residues in promoting soil fertility.

INVESTIGATIONS ON THE UTILIZATION OF BAGASSE FOR POWER ALCOHOL.

Another project that is to engage some of the attention of this Department, is the possibility of recovering the residual sugars from bagasse by fermentation prior to its use for building board manufacture or for fuel. Preliminary experiments have already begun on the fermentation of bagasse, which are to be followed by the utilization of bagasse as a material for the preparation of a manure.

Under the superior facilities that exist in the new quarters for research work, it is our confident expectation that the work of this Department should, from this time, reflect these enhanced opportunities, both in the character of research undertaken and in the progress made thereupon.

DEPARTMENT OF CHEMICAL RESEARCH, LOUISIANA SUGAR EXPERIMENT STATION.

J. F. BREWSTER, Research Chemist.

The main project of the research chemical department of the Sugar Experiment Station for many years, has been the study of cane juice clarification. In the past year these studies were continued and some attention was given to clarification with the production of table syrup in view.

CANE JUICE CLARIFICATION FOR TABLE SYRUP.

It has long been recognized that the best grades of table syrup manufactured from cane are made by the open kettle process, in which no chemical treatment or filtration is used for clarification. What clarification takes place is the result of skimming the rapidly boiling juice and allowing the hot syrup to settle. No doubt the characteristic flavor of open kettle syrup is due, in part, to the presence of what, in sugar making are termed impurities, and in part, also, to the high temperature evaporation which, in effect, is nothing more than thorough cooking, a necessity in the preparation of most foodstuffs.

At the time of cane harvest in 1924, there was a good demand for table syrup at high prices, and it was very timely to try the manufacture of syrup on a larger scale in houses equipped with vacuum evaporators instead of open kettles. Some sort of preliminary clarification is necessary when vacuum evaporators are to be employed. Treatment of the juice with lime alone yields a syrup usually dark in color and with a flavor resembling that of molasses. Syrup prepared by sulfuring and liming the juice meets with a rather restricted demand, for the reason that most consumers object to the slight taste imparted by small amounts of sulfites. A much more palatable sulfur-treated syrup results when evaporation takes place entirely, or is finished at atmospheric pressure. In fact, open evaporation, or at least open finishing, would seem in our experience, to yield better syrup than low pressure evaporation for any given method of clarification.

When the price of syrup warrants it, filtration of the juice with diatomaceous earth, or with a limited amount of decolorizing carbon, is feasible as far as the quality of open boiled syrup is concerned. Clarification with phosphoric acid and lime also yields good syrup and the process of treatment is simple because settling may be resorted to as in the ordinary defecation method of sugar manufacture. A good clarification with phosphoric acid may be obtained by increasing the acidity of the juice by 1 to 1½ cc. N/10 in a 10 cc. juice sample and liming back to approximately the natural acidity of the juice. The cost for phosphoric acid will increase the cost of making syrup by one-half to one cent per gallon. Calcium carbonate in the form of precipitated chalk reacts with phosphoric acid to remove the latter as insoluble calcium phosphate. An excess of calcium carbonate will not lead to undue darkening of the juice nor will it reduce the natural acidity of the juice by more than half. Further calcium carbonate may be added to the hot juice without producing the so-called burning effect of lime under the same conditions. Precipitated chalk alone has proven to be a good clarifying agent for syrup making and may be added to the juice in water suspension in the same manner as lime is now added, the mixture being heated and allowed to settle; or it may be filtered if a large excess is used. It is realized that no Louisiana sugar houses are at present equipped for freshly preparing precipitated calcium carbonate. It is also true that only a limited number of houses are making syrup every year. However, if the growing of sugar beets in Louisiana proves to be a profitable undertaking and beet sugar processes are installed, there is every reason to believe that such processes may be so modified as to be useful in the large scale production of good table syrup from cane.

DECOLORIZING CARBONS.

The study of methods for the preparation of decolorizing carbons has been continued with attention being directed to the utilization of sugar cane bagasse as a raw material. Good carbons were prepared at the Sugar Station from bagasse several years ago. The present work has as its object the simplifying and cheapening of methods,

REMOVAL OF THE SUGAR EXPERIMENT STATION FROM AUDUBON PARK TO BATON ROUGE.

At the beginning of 1925, the sugar house at Audubon Park was dismantled and the machinery and fittings later shipped to Baton Rouge, where they were installed in the new sugar house. In August and September of this year, the laboratories at the Park were also dismantled and the equipment forwarded to the new University, The writer was unable to participate in the dismantling of the laboratories on account of illness, which began in midsummer. The Chemical Research department of the Sugar Station is now located in the Chemistry building of the new University, where excellent rooms are provided.

DEPARTMENT OF ENTOMOLOGY.

W. E. HINDS, Entomologist.
HERBERT SPENCER, Assistant Entomologist.
SHELBY JACKSON, Student Assistant.

During the year 1925 slightly more than one-half of the time of the Entomologist has been devoted to Experiment Station work. Assistant Entomologist William G. Bradley resigned, effective June 5th, 1925. In his stead Herbert Spencer, Ph. D., became Assistant Entomologist late in September 1925. During the year, Messrs. T. P. Dutch, Shelby Jackson, and Leon Mitchell have assisted in carrying on this work. Mr. H. L. Alford conducted the investigation of Bakers' New Arsenical,

During 1925, the three major current projects for investigation have been:—

1. The control of the Mexican cotton boll weevil.
2. The control of the cotton plant louse.
3. The sugar cane borer and its control.

Investigations of minor importance have included:

1. The control of plant lice on turnips, cabbage, cauliflower, collards, roses, etc.
2. Onion thrips control.
3. Horn fly control and repellants.
4. Spraying versus dusting for control of curculio and brown rot of peaches.
5. Home-made oil emulsions for control of San Jose Scale.

6. An investigation of an outbreak of a caterpillar (Acrolophus species) destroying grass on lawns and in pastures.
7. Calcium and sodium fluosilicates as insecticides.
8. Bakers New Arsenical.
9. Toxicity tests on cotton for boll weevil control.

NEW PROJECTS.

During the year a new project has been outlined with Dr. Spencer as leader, and is entitled "Cattle Parasites and Their Control." This project contemplates a study particularly, of the internal parasites of cattle and constitutes an exceedingly important pasture problem in this State.

BOLL WEEVIL CONTROL.

In the study of the boll weevil, the hibernation tests started in the fall of 1924, included 1956 weevils placed in cages between October 4, and 15. Of these, only one weevil, or 0.005 per cent, emerged, the following spring, and this was on May 15. Among 5,370 weevils placed in cages from October 31 to November 29, 1924, 483 weevils, or practically 9 percent survived. Weevils began to leave winter quarters in the cages by the middle of February 1925, before cotton was planted in this section. The peak of the emergence movement occurred during the last week of April, and the last weevil appeared on June 12. The per cent of survival, as a whole, was unusually high and indicated a serious degree of attack on the 1925 cotton crop in the vicinity of Baton Rouge. This forecast was fully upheld by the heavy weevil development occurring during the season.

In the insecticidal control phase of the work, over seventeen acres of cotton were included in the tests and check plats in our regular series of weevil control tests. These included nine unpoisoned check areas, from which an average yield of 785 pounds of seed cotton per acre, were picked. From fourteen dusted plats an average yield of 1,308.5 pounds of seed cotton per acre was secured. This shows an average net increase in yield saved from boll weevil destruction by the poison applied, amounting to 523.5 pounds of seed cotton per acre. This gain from poisoning amounted to two-thirds of the total yield secured without the use of poison.

The average number of dust applications given to all treated plats was seven, with a range of from five to ten. The dosage of calcium arsenate applied averaged approximately 6.5 pounds or 45 pounds per acre as the total for the season. The average cost for poison used was approximately 9 cents per pound.

Besides the foregoing tests, a general program of complete dusting for weevil control was applied to six cuts of cotton grown by Professor A. F. Kidder, in agronomic experiments where no check areas were left, but the location of the plats was such that the figures for average check yield given above—785 pounds—may be compared very fairly with the average of 1490 pounds secured on these six plats. This indicates a gain from the general dusting on these plats amounting to 705 pounds per acre on the average. Infestation records were taken every few days on this entire acreage, and the degree of weevil control secured as shown by the reduction in infestation, was quite closely comparable on both series of tests.

AIRPLANE DUSTING.

The application of calcium arsenate to cotton for weevil control by means of airplanes was undertaken in a commercial way and upon a large scale in Louisiana, for the first time, in 1925. The Huff-Daland Dusters, Inc., was the only concern in the field this year. This work was closely watched from the experimental standpoint, also. With four airplane dusting units at work, more than 50,000 acre-applications were made to cotton for weevil control. In addition to this, large areas were treated for cotton leaf worm control, and a small amount of work was done for control of the cotton plant louse. While no real checks could be kept, and picking records are incomplete and less reliable than required in our Experiment Station work, we have reason to believe, from the records showing the reduction in weevil infestation occurring as a result of this dusting, and from the very notable increases in yield secured as a rule, where such poisoning was done, that the results secured from airplane work were at least as good as those described above from ground machine work. There would seem to be an excellent prospect in Louisiana for the expansion of airplane dusting for boll weevil control.

COTTON PLANT LOUSE CONTROL.

The poisoning of cotton for boll weevil control has undoubtedly some direct effect in increasing the infestation by the cotton plant louse. These lice are frequently seriously abundant even where no poison is applied. The control of these lice has been one of our major problems and we believe that a fairly satisfactory and economical solution has been found. The experimental work of 1925 has more than confirmed the indications found during a previous study of this problem in the fall of 1924. The plant louse infestation of 1925 was unusually severe and threatened early defoliation of most of the poisoned plats early in the season. Whenever this threat became serious it was found that an immediate application of a combination of one-half pound of nicotine sulphate, containing forty percent of nicotine with eight pounds of calcium arsenate used as the carrier for the nicotine, applied during periods of still air, by the same machinery and in the same manner as used for boll weevil control, gave excellent results in plant louse control also.

The most important factor in securing satisfactory control appeared to be a practically still condition of air for a short time, at least, after the mixture was applied. Under such conditions it was so effective that more than ninety-eight percent of cotton plant lice were destroyed, and in several cases the control was so complete that no further treatment for the lice became necessary during the season. In some cases, however, a second treatment was necessary.

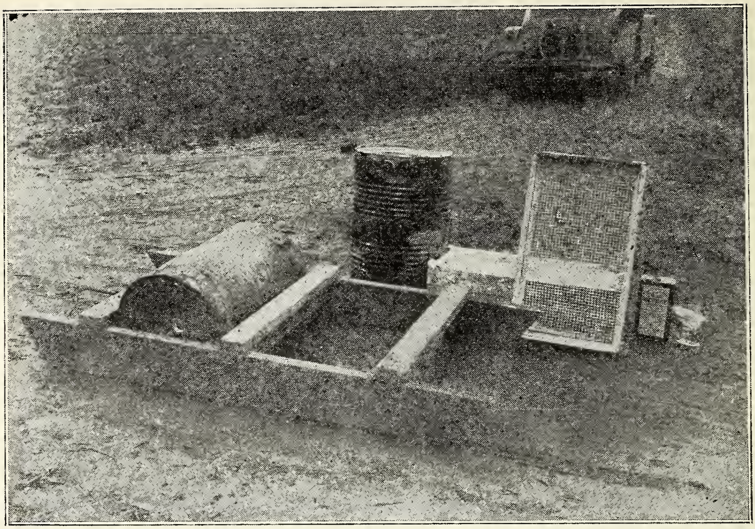
"CALARNIC DUST."

For the mixture of calcium arsenate with nicotine sulphate, we have suggested the use of the common name, "Calarnic Dust," just as the name "Nico Dust" is used commonly for mixtures of nicotine sulphate with hydrated lime or other non-poisonous carriers. The latter mixture may be used for plant lice alone, or where no chewing insects are concerned. The formula used consisted of eight ounces of nicotine sulphate thoroughly mixed in eight pounds of high grade calcium arsenate and this mixture contained approximately 2.4 percent of nicotine.

HOME MIXING DEVICE.

Simple equipment has been devised for preparing on the farms, fresh mixtures of either of these dusts from stock material. An illustration and a previous description of a diagonal axis mixing drum turned by a crank, is given in Louisiana Extension Circular 79. An improvement over the use of small rocks, suggested in that Circular, for rolling and grinding agents, consists in the substitution therefor in each mixing drum used, of two or three pieces of old iron piping, or of straight wooden rollers cut about two inches shorter than the inside measurements of the drum in which they are to be used. Such rollers may be of any diameter from three-fourths inch pipe to two inch wooden rollers but they should have sufficient weight to accomplish efficient rolling and mixing of the dust. The use of such rollers makes it unnecessary to run the mixed dust through a screen, and the mixture may be left in the drum if desired, until it is transferred to the hopper of the dusting machine.

When a considerable quantity of "Calarnic Dust" is needed, we recommend making a modification of a sled-like framework device suggested in Maryland Bulletin No. 261, so that two, three, or even more mixing drums may be used at a time and rolled along the ground for at least five minutes as the sled is drawn back and forth by horse or mule. The metal drums in which calcium arsenate is usually sold, are very satisfactory for these mixing drums, and the dimensions of the sled may be made accordingly.



Home-made sled for rolling drums in mixing nicotine dust. Length of sled may be made to accommodate 1, 2 or 3 drums at a time.

With such apparatus, about thirty-two pounds of hydrated lime and two pounds of nicotine sulphate may be mixed in each drum, and a total of approximately one hundred pounds may be prepared in about fifteen minutes, by a three-drum outfit of this kind. Such home-made mixtures should be at their maximum strength and freshly used, while their cost is much below that of commercial preparations and they may be prepared very easily when needed.

SUGAR CANE BORER.

The sugar cane borer was not especially abundant in Louisiana in 1924, but became exceedingly injurious after the first of August, 1925. Our attention has been given principally to testing measures for controlling this pest and for studying the work of the egg parasites upon the eggs of the cane borer and the effect of various agricultural or control measures upon the hibernation of both borers and parasites. Heretofore we have had no effective insecticidal control applicable to sugar cane for this important pest.

Through the generous cooperation of Huff-Daland Dusters, we were able during September to determine the effectiveness of several insecticides applied to the cane by one of the airplanes previously used in boll weevil control work. The distribution of calcium arsenate poison appeared to be very ideal, but one and two applications failed to kill any large proportion of the borers. It appeared that the larvae were able to travel over and work through the calcium arsenate dust without devouring it in lethal quantity. Practically no dead worms were found in extensive examinations of the cane dusted with straight calcium arsenate.

In another test, in which five percent of dextrine was mixed with the calcium arsenate, there seemed to be an increase in its effectiveness, and about twenty percent of the borers were found dead in, and on, such treated cane. The most promising results, however, were secured from an application of sodium fluosilicate, applied by a plane. The particular material used was in very poor condition for dusting but still gave a very encouraging degree of control. Examinations made four and five days after the dust was applied, showed very few living larvae of any size, while more than ninety percent of the larvae of all sizes were found dead on the leaves and within the stalks where the fluosilicate was plainly in evidence on the foliage. We were surprised to find many nearly grown larvae dead within their burrows. It appeared that the killing effect continued for a number of days after the dust was applied. No serious burning of the cane resulted from the application of undiluted sodium fluosilicate. These encouraging results will form the basis for much more extensive experimental work planned for 1926.

MISCELLANEOUS INVESTIGATIONS.

In the miscellaneous minor investigations, very satisfactory control of plant lice was secured by "Calarnic" 2.4 percent dust, applied to turnips, mustard, and similar crops commonly grown in beds, and also in the treatment of aphids, on roses particularly. The onion thrip was not controlled by dust as effectively as by spray applications containing nicotine and soap.

The horn fly, as a pest on dairy cattle especially, has been controlled or repelled quite effectively by a method of spray treatment worked out by Mr. Bradley. The preferred formula consisted of one pint of water and one-fourth pound of fish oil soap, heated together until the soap is thoroughly dissolved. To this soap solution is added one quart of red pine oil. This mixture is brought to the boiling point and emulsified by pumping under pressure. To this emulsion may be added 30 cc of Derrisine liquid or 90 cc. of free nicotine and 250 cc. of creosote. The entire mixture is fully emulsified by further pumping and forms the stock solution, one part of which is used with twelve parts of cold water to form the spray. This material was applied to cattle by a barrel pump connected with piping so that two nozzles were placed on each side of a chute through which the cattle were driven for treatment. The spray from the four nozzles formed a solid sheet of spray through which the cattle passed quickly and a very large proportion of the horn flies were hit by the spray before they could take flight.

In the peach dusting and spraying work, conclusions were impossible because the crop was entirely removed by thieves just as it began to mature.

Sodium fluosilicate was tested for control of the boll weevil and of the cane borer, in field operations, and was also tested quite carefully in comparisons with other poisons for the boll weevil in cage toxicity tests. Calcium fluosilicate was obtained only late in the season and but little field work was possible with it, but it appeared that this material is probably less toxic to foliage and also less toxic to insects than is the sodium fluosilicate.

The investigation on Bakers New Arsenical was conducted through a cooperative agreement by which H. J. Baker and Brothers, New York, supplied materials and bore the expense for about ten week's study of this problem by Mr. Alford. In these tests Baker's New Arsenical was compared with calcium arsenate and with various other poisons to see whether the new material possessed any distinct advantage over materials previously used. As a general result, we can state that the Baker's New Arsenical showed a fairly high degree of insecticidal effectiveness, but as a rule, this was not equal to that of calcium arsenate applied at the same time. Killing by the New Arsenical was somewhat slower than with calcium arsenate. No serious burning of cotton foliage was noted in any of these tests and the new material did not show any marked superiority in adhesion in spite of the rains. There was some evidence of a repellant effect to boll weevil by the New Arsenical during the first few hours after the dust was applied but this did not continue beyond that time and did not prevent a very considerable degree of feeding on, and oviposition in the dusted squares.

DEPARTMENT OF HORTICULTURE

(At Baton Rouge)

G. L. TIEBOUT, Horticulturist.

CONTINUATION OF STRAIN TEST WORK WITH CERTIFIED TRIUMPH SEED POTATOES.

Strain test work with certified Triumph seed potatoes from western and central-northern states to determine which state or states, section or sections, produce the best certified Triumph seed potatoes for Louisiana, was the major activity in horticulture.

NATURE AND SCOPE OF WORK.

One hundred and ten lots of certified Triumph seed from Nebraska; twenty-five lots from Montana; seventeen lots from North Dakota, Minnesota, South Dakota, Wisconsin and miscellaneous sources, were included in the test plots in this project, and disease readings were made by Dr. Wm. Stuart, of the United States Department of Agriculture, and visiting specialists from most of the states represented. Conditions were very favorable for mosaic expression—the primary object of the test. However, the season in general was very unfavorable on account of the severe drouth; in consequence, the yields were very low.

The relative average freedom from the mosaic disease of the one hundred and thirty-five lots from Nebraska and

Montana, 1.5 percent and 3.7 percent respectively, stands out in very significant contrast to the seventeen lots from the other sources that showed an average of 28.5 percent mosaic disease.

This strain test work with certified Triumph seed potatoes is a cooperative project, undertaken between states in studying a mutual problem. Thirteen out-of-state visitors, including federal and state potato specialists, dealers, growers, agricultural editors, as well as a local and state representatives of allied interests, visited these tests during the annual potato tour. Dr. Stuart, Director P. F. Trowbridge, Experiment Station, Fargo, North Dakota; Professor F. M. Harrington, in charge of potato certification, Agricultural College, Bozeman, Montana; Dr. R. W. Goss, University of Nebraska, Lincoln; and Mr. M. E. Luther, of the University of Wisconsin, were among the potato specialists who participated in this study.

SEED SWEET POTATO IMPROVEMENT WORK.

Tests with strains of Porto Rican sweet potatoes have been inaugurated to determine whether there are any superior ones within the variety; also work in testing the value of "slips" versus cuttings, and in comparing various methods of planting cuttings, has been started.

The greenhouse at the old University site was dismantled for removal to the new site.

DEPARTMENT OF PLANT PATHOLOGY.

C. W. EDGERTON, Plant Pathologist.
E. C. TIMS, Assistant Pathologist.
E. V. ABBOTT, Assistant Pathologist.

During the year 1925 the work in the Department of Plant Pathology followed rather closely that of the preceding year. Most of the time was devoted to a few projects, though as usual, some attention was paid to the general disease conditions over the State and to less urgent problems. The projects receiving the most attention were those on sugar cane diseases, tomato wilt, and the soil flora.

The project on corn root rots was completed and the results published in Louisiana Bulletin No. 193.

SUGAR CANE DISEASES.

Sugar cane did not suffer as severely from diseases as was the case in 1924, but a close check was kept on the disease situation. All members of the staff spent most of their time during the summer and fall on the cane disease problems. A careful record was kept of the development of the cane in the test fields over the State. A series of meetings was held at the Cane Experiment Station, at which demonstrations were made showing the value of seed selection.

The work of selecting strains tolerant to mosaic, which had been in progress since 1920, was continued. The selected strains of D-74 and Louisiana Purple, which had been carried through four years, continued to show a high degree of tolerance to the disease. There was enough seed to plant more than an acre each of D-74 and Purple in the fall of 1925. The work of selecting cane resistant to mosaic was continued in the test fields established over the state.

Because of the fact that 1925 was a much more favorable year for the growth of the cane, the root rot trouble was not nearly as serious as it was in 1924. The work of culturing diseased cane roots from various parts of the State was continued throughout the year. Species of Rhizoctonia and Pythium in addition to Marasmius were found to be constantly associated with decayed and decaying roots. Experiments were continued in the laboratory and field to determine the importance of these organisms in bringing about the root rot disease. A series of seed treatment tests in which a wide variety of compounds was used, was started in the field at Baton Rouge. In addition to the other chemical compounds, cyanamid was tried in a series of tests to determine whether it may have some fungicidal value in addition to its fertilizing qualities. Seed treatment work was continued at the test fields over the State.

TOMATO WILT.

The tomato wilt project was confined to the growing of stock seed of the wilt resistant selections which have been developed at this Station and used by the tomato growers of the State for several years. These strains continue to give good results wherever they are used.

SOIL FLORA STUDIES.

A study of the soil flora, including both bacteria and fungi, was started as a new project under the Purnell Fund. Work was actively begun on August 1. The numbers and kinds of organisms in the different soils and at different seasons will be determined. The effect of these organisms on nitrogen fixations, and other soil problems will be ascertained.

CHANGES IN THE STAFF.

Dr. E. V. Abbott was appointed Assistant Pathologist July 1, 1925.

PUBLICATIONS DURING 1925.

C. W. Edgerton and W. G. Taggart. Tolerance and Resistance to the Sugar Cane Mosaic. Jour. Agri. Research. Vol. 29, No. 10, pp. 501-506.

C. W. Edgerton and A. F. Kidder. Fungus Infection of Seed Corn Kernels and the Importance of Germination Tests. Louisiana Sta. Bulletin 193.

C. W. Edgerton. Sugar Cane Growth in 1924 and 1925. The Planter and Sugar Manufacturer. Vol. 75, pp. 251-253.

SUGAR EXPERIMENT STATION.

W. G. TAGGART, Assistant Director.
D. J. DeARENSBOURG, Field Overseer.

The field work of the Sugar Station is now occupying nearly one hundred and fifty acres of land. The following subjects are the more important ones embraced in our many projects:

1. ROTATIONS, FERTILIZER PLOTS, ETC.

Eighty plots are devoted to rotation systems of three year cropping systems of three-year cropping, with cane two years and other crops one year, and four year cropping with cane two years and other crops two.

As every crop is provided for every year, the individual experiments are multiplied by three in the three-year rotation, and by four in the four-year rotation. The variables are in applications of commercial fertilizers, use and disposition of legume crop, disposition of cane trash, etc. Data on yields, resistance to disease and drouth, etc., are recorded and from now on sugar content of cane juice will be a part of our records.

2. SEEDLING CANES.

We are stressing the variety work. Under our new agreement with the Office of Sugar Plant Investigations, U. S. Department of Agriculture, we are paying $1,000 a year for labor at Canal Point, Florida, for assisting in caring for new seedlings secured there by the plant breeders of the Department of Agriculture, and cuttings of all new seedlings are to be sent to us at Baton Rouge at the same time that they are sent to the Government Station at Houma, La. It will be recalled that our importation of new varieties and our work of germinating seeds for securing new seedlings at the Sugar Station was interrupted when the Federal Horticultural Board passed such stringent regulations on importations as to make it impossible to have canes or cane seeds survive the quarantine treatment.

In response to the appeals of the Director of the Experiment Stations, and our representatives in Congress, that same provision be made for continuing the seedling work, the United States Department of Agriculture agreed to import cuttings of promising canes from other countries, grow them in green houses at Washington, D. C., for a year and then send them to us, if they were known to be free from disease and insect pests. Also to import seeds, germinate them and keep them under observation until it was determined that they conveyed no foreign disease or pest, and then send them to us for trial in Louisiana. Afterwards it seemed best that new canes should be grown at some point outside of the commercial growing area, for further observance for a year or more before bringing them to Louisiana. Provision was made for this work at Canal Point, Florida. Seed breeding could also be carried on at

Canal Point. In the course of time we began to receive cuttings of new canes from the United States Department of Agriculture. In 1924 the Department established its own Sugar Experiment Station, at Houma, La.

While the cooperative relationship of the Office of Sugar Plant Investigations and the Louisiana Sugar Experiment Stations were not as clearly defined as they should have been, prior to 1925, we believe that a satisfactory basis of cooperation has been agreed upon, in which the Office of Sugar Plant Investigations, the Sugar Experiment Station and the American Sugar Cane League are cooperating organizations for testing new canes, and making initial distributions of new meritorious varieties.

We received from the Department last year, 568 new seedlings for trial here. As is usual with new seedlings, most of them were low in sucrose but a few have shown fair sugar content and immunity from mosaic.

A few of the varieties that have been showing good growth and fair sugar content for two or more years, have been planted to the full extent of our available seed cane. One of the older U. S. Seedlings was still green, growing up to December 14th, 1925, with nine percent sucrose, although we had freezing temperature several times prior to that date.

MISCELLANEOUS EXPERIMENTS.

Besides the major projects on sugar cane, we have a goodly number of experiments on other things. Varieties of soy beans, methods of planting corn and soy beans, combinations of soybeans and cowpeas, have been under experimentation, affording lessons that have been of much interest to visitors and that will afford valuable data for publication later. Experiments on the disposition of cane trash. have been continued.

Fertilizer experiments included tests of new products, such as Leuna saltpeter, Nitrapo, and methods of applying cyanamid, sulphate of ammonia, etc.

SUGAR CANE TEST FIELDS.

D. N. BARROW.

In the spring of 1925, it was decided to establish six sugar cane test fields throughout the sugar district, for the purpose of demonstrating work that had already been tested at the Sugar Experiment Station, and of finding out its applicability under actual field conditions. The location of these stations was determined, after conference with the American Sugar Cane League, as follows:

Sugar Cane Test Field No. 1. At Glenwood Plantation, Glenwood Sugars Cooperating.
No. 2. At Raceland, Godchaux Sugars Cooperating.
No. 3. At Reserve, Godchaux Sugars Cooperating.
No. 4. At Sterling Plantation, Sterling Sugars Cooperating.
No. 5. At Youngsville, Youngsville Mfg. Co., Cooperating.
No. 6. At Angola, La. State Penitentiary Board, Cooperating.

The following work was planned for these stations:

1. The testing of new varieties of cane, secured through cooperation with the Office of Sugar Plant Investigations, United States Department of Agriculture.
2. The selection of native canes (the standard varieties) for disease resistance.
3. The treatment of seed cane for the control of disease.
4. The value of a three-year rotation on soil fertility.
5. The value of a four-year rotation on soil fertility.
6. The value of melilotus indica on soil fertility.

It was late in the season when this work was started and so it was not possible to inaugurate all of the work planned on all six stations. At Sterling, Angola, and

Youngsville, only the test of varieties was inaugurated, while this, in addition to seed selection and cane treatment, was established at Glenwood, Raceland, and Reserve.

A tentative start was also made at these last stations, and at Sterling to establish the work in rotation of crops, both as regards the three and the four-year rotation.

The plantings of varieties were made in the fall of 1924. Unfortunately, weather conditions were so unfavorable at Sterling and Youngsville, that the planting of the varieties of cane was unavoidably delayed until the seed was caught by a freeze. As a consequence, poor stands were obtained at both these stations, while good stands were obtained at the other points. In order to compensate for the defective stand at Youngsville, small quantities of a number of varieties were obtained from the United States Government station, at Canal Point, Florida, and planted in the spring.

The work with these varieties consisted in supervising their proper culture, making notes upon their growth at various periods and sampling and having those samples analyzed in the fall. The sampling was done at two different periods, once just before a freeze and once after the freeze had killed the cane. After growth had ceased from cold, such of these varieties as showed merit, were replanted upon these test stations.

The work with seed selection consisted in selecting from the growing canes during the fall, such stools as showed by their growth and general appearance that they had acquired an apparent immunity or resistance to mosaic disease. These stools were carefully cut and planted.

From April 1st until August, monthly counts were made of the number of stalks growing. This count included not only the original sprouts from the eyes, but later on, all suckers that appeared. The work of treatment of seed cane consisted of soaking the seed in various solutions for the control of root rot. The cane so treated was then planted, and monthly counts kept as with the selected cane.

It was intended to also secure weights of each of these plats at the time of cutting for harvest but from the middle of August until the freezing weather finally put a stop to their growth, they were so severely attacked by borers that all results from weights were completely vitiated and such work was not done. The same pest so completely destroyed the other cane in the fields that the results upon the tentative rotation work were not deemed reliable, and so weights upon this work were not kept.

SUGAR BEET WORK.

In September, the Station embarked in an extensive campaign for the testing of the possibilities of growing sugar beets in the sugar district of Louisiana. It was decided to build a small beet sugar plant at the University and to grow about a hundred acres of beets, distributed in five acre lots all over the sugar district, for the manufacture of sugar at this central plant. The grower of the beets stands all of the expense of the work of planting, cultivating, and harvesting the crop, while the Station is to pay transportation on the beets and manufacture them into sugar.

It was late before plans could be perfected and it was the 10th of November before planting could be done. Twenty sugar planters volunteered to plant areas of about five acres each for this experiment.

The Experiment Stations purchased two regular Planet Jr. sugar beet planters, and these were taken from field to field, in so far as was practicable and the planting done with them, under the supervision of Mr. Barrow. Progress in planting, therefore, was necessarily slow, but by the 10th of December about sixty acres were thus planted. Other planters did their own planting.

The fall plantings were followed by extremely heavy rains and as a consequence, many of the plantings were entirely destroyed. Partial stands were obtained, however, by J. W. Supple, R. G. Malhiot, the Penitentiary Farm at St. Gabriel and the Penitentiary Farm at Angola, and H. N. Sherburn.

While the work on the whole, during the past year has, for reasons that could not be controlled, proved rather unsatisfactory, yet, it has not been without value. The whole subject of test stations was new and there was no precedent to follow; so much has been learned as to how best to do such work. It is apparent that much closer supervision than was possible under the conditions that prevailed last year, must be given to the work, and that the work must be better systematized. To accomplish this, one man should devote his whole time to the project. Again, all work to be done upon these stations should be done with the knowledge, and under the supervision of the man in charge of same, and all reports of such work should be made to him.

SUGAR ENGINEERING.

J. J. MUNSON.

We have undertaken two projects under the Purnell Fund, in Sugar House work. The first project is devoted to experiments in the manufacture of cane syrup and the second to experiments in recovering sugar from Louisiana sugar beets.

An open pan of special pattern, devised by Mr. Munson, has been installed for syrup making and good progress has been made toward the installation of the necessary equipment for manufacturing sugar from sugar beets. The Building Committee of the University appropriated $25,000 for the installation of machinery for experiments with sugar beets. The plantation will be in readiness for operation about the middle of May, 1926.

Thirty sugar planters in different portions of the State, are cooperating with the Experiment Stations by growing from one to four acres each of sugar beets, to be shipped to Baton Rouge for manufacture.

From previous experiments extending over a number of years, we have a fairly good reason to believe that beets can be grown, of good enough qaulity, to render their manufacture profitable. Installation of this machinery will enable us to make a commercial test of this possibility.

EXPERIMENT STATION LABORATORY.

(Fertilizer and Feed Control Work.)

A. P. KERR, Chief Chemist.
J. H. JOLLY, Asst. Chemist.
JESSE L. FARR, Asst. Chemist.
W. P. DENSON, Asst. Chemist.
C. C. MORELAND, Asst. Chemist.
OTIS BROUSSARD, Student Assistant.

The Experiment Station laboratory has made all analyses of feed and fertilizer, in control work for the State Department of Agriculture. Analyses of insecticides have also been made. This work comes under Act 233 of 1924, which delegates the same power to the State Department of Agriculture as does the Fertilizer and Feed Stuffs law. One of the beneficial effects of the Insecticide law is to keep out so many insecticides that have not passed through the proper experimental stage.

The laboratory is called upon from time to time to make soil analyses for farmers of the State. As there are so many outside factors that have to be taken into consideration, an analysis of soil without any other information, means very little, either to the farmer or to the Experiment Station.

The laboratory is crowded all the time with miscellaneous work, poison cases, etc. Although our time is very limited, we have always managed to take care of this kind of work.

On December 15, 1925, we moved to the new quarters on the old campus, which has very much facilitated our work.

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA.

SIDNEY STEWART, Superintendent.

The work at this station during the past season has consisted of the following projects:

1. Compost vs. Acid Phosphate.

This project has been carried on continuously since 1889.

2. Cotton Fertilization Tests With and Without Dusting for Weevil Control.

There are two different projects under this head.

3. Velvet Bean Variety Test.
4. Soy Bean Variety Test.
5. Corn Variety Test.
6. Cotton Variety Test.
7. Forage Crops.
8. Three-Year Rotation Demonstration.

This work includes forty-seven acres, divided into three areas, named 1, 2, and 3, respectively.

More soy beans were planted this year than usual and some lots where the soil was good yielded about one ton per acre of cured hay, the Biloxi proving the heavier yielder. With a good season at the right time, the yield would have been considerably more. Biloxi soy beans, between 6 foot corn rows, yielded better than eight bushels of seed per acre.

In trying to put to use some of the organic matter from Kudzu vines, the plot on which there is a heavy growth of this plant was turned under during last winter and planted in corn, after receiving an application of 200 pounds of acid phosphate per acre. Due to the lack of moisture necessary to decay the vegetation properly, the yield of corn was unsatisfactory, being about 20 bushels per acre.

The total amount of cotton produced this season, was 21,503 pounds, from which 15 bales of cotton, averaging 516 pounds per bale were ginned. This was produced on 18½ acres. Due to the scarcity of extra labor to help pick the cotton, the fall rains caught a considerable amount of it in the fields, and as a result, more than a bale of cotton was lost.

The corn yield for the place averaged about 23 bushels per acre, the total amount harvested being 72,024 pounds.

Several tons of soy bean, cowpea, sorghum and Bermuda grass hay are baled and stored for future use, in which respect the Station is better prepared than last season.

Due to the drouth of 1924, feed for the stock was scarce, and a considerable amount of mixed feeds had to be bought. In order to reduce this expense as much as possible, a plot of Early Amber and Orange sorghum was planted, which furnished an abundance of feed, upon which the work stock thrived, even while at hard work.

The yield from each variety of sorghum per acre, is as follows:

Variety.	First Cutting.	Second Cutting.	Third Cutting.
Early Amber	8 Tons per A.	5 Tons per A.	2 Tons per A.
Orange	9 Tons per A.	7 Tons per A.	2½ Tons per A.

The last cutting was shocked green, on cross-arms on upright poles in the plot, and cured. It has furnished good forage for the stock, which are allowed to graze it at will during the winter.

The meetings of the North Louisiana Agricultural Society have been held regularly each month during the summer, for which, programs of general interest have been arranged. The meetings were usually well attended.

The North Louisiana Agricultural Fair was held on the Experiment Station grounds, October 20-23. Professor G. S. Manning, Principal of the Calhoun High School, was elected Secretary, in which capacity he, assisted by Mrs. Sidney Stewart and others, arranged and held a very creditable fair. What was formerly used as a dining hall was converted into a poultry building, which proved satisfactory.

A new one-ton Ford truck was bought during September, 1925.

The livestock (mules and horses) consists of four mules, ranging in ages from 9 years to 16 years of age; two mule colts, 1 six months old, the other 2½ years old; one mare, the mother of the colts, and 1 saddle mare. The mule colts are well developed and the older one will be put in on regular work this year.

The pecan crop was very poor this year. Only a few varieties put on and held a normal amount of nuts, and they were of poor quality, being immature and shrivelled. The "Texas Prolific", however, bore the only crop of big, well filled nuts within its history, at this station. Ordinarily it has nothing, or a light crop of small nuts. Other varieties bearing this year are as follows: Moneymaker, Senator, Delmas, Nelson, Success, and Stuart. All had an ordinary crop of poorly filled nuts. The Schley, Pabst, Van Deman, Carmen, President, Centennial, Columbia, and Jerome had practically nothing. The Teche, Curtis, and Bradley had nothing at all.

The vacancies in the pecan orchard and in the orchard set out in 1922, were filled last winter, but some of them died during the summer and two were killed by gophers. These spaces are to be filled soon.

THREE YEAR COMPOST ROTATION EXPERIMENT

Plots A, B, C, Experiment Field

In this experiment, one-third of the area is planted to cotton, one-third to corn and cowpeas, and one-third to oats, followed by cowpeas.

During the period between 1889 and 1908, the east half of each plot received an application of compost, at the rate of 30 bushels per acre. Since 1908 the compost has been applied to the south half of each plot; therefore, one-fourth of each plot has received compost annually since 1889, one-fourth has received compost annually since 1908, and one-fourth received it annually until 1908, while the remaining fourth has never had compost at any time. This compost is made up of green cotton seed, stable manure, and acid phosphate.

Results for 1925 on these plots are as follows:

	SE¼ Fertilized annually with compost since 1889	SW¼ Fertilized annually with compost since 1908	NE¼ Fertilized annually with compost since 1908	NW¼ Has received no fertilizer since beginning of experiment
Plot A Cotton	667.90 lbs. per acre	596.88 lbs. per acre	476.92 lbs. per acre	364.75 lbs. per acre
Plot B Corn	9.16 Bu. per acre	8.09 Bu. per acre	6.86 Bu. per acre	2.42 Bu. per acre
Plot C Oats	.386 tons per acre	.233 tons per acre	.333 tons per acre	.180 tons per acre
Cow-peas.	.480 tons per acre	.391 tons per acre	.430 tons per acre	.319 tons per acre

COTTON FERTILIZER EXPERIMENTS, WITH AND WITHOUT DUSTING, FOR WEEVIL CONTROL.

Plot 1. Experiment Field.

Fertilization Scheme:

Comparison of acid phosphate alone, at the rate of 200 lbs. per acre; nitrate of soda alone, 200 lbs. per acre; sulfate of ammonia, alone 150 lbs. per acre, and a combination of each, as follows:—Phosphate and nitrate of soda, phosphate and sulfate of ammonia, also usual home mixed formula (cotton seed meal and acid phosphate).

Each plot consists of four rows, and replicated four times across the plot.

			Yield	Pounds per Acre
Plot	1.	Unfertilized (Check)	37.75	1117.50
	2.	Acid Phosphate, 200 lbs. per acre	37.81	1134.50
	3.	Nitrate of Soda, 200 lbs. per acre	37.88	1136.40
	4.	Sulfate of Ammonia, 150 lbs. per acre	38	1140
	5.	Acid Phosphate, 200 lbs., nitrate soda 200 lbs.	38.75	1162.50
	6.	Acid Phosphate, 200 lbs., sulfate of ammonia, 150 lbs.	39.94	1198.20
	7.	Acid Phosphate, 200 lbs., nitrate of soda, 300 lbs.	40.38	1211.40
	8.	Acid Phosphate 200 lbs., sulfate of ammonia, 250 lbs.	44.19	1325.70
	9.	Acid Phosphate 200 lbs. C. S. Meal 200	39.13	1173.80
	10.	Acid Phosphate 200 lbs. C. S. Meal 400	41.31	1239.30

The plan was to leave the series at each end undusted, the remainder or the two central series, dusted by regular schedule for weevil control. Due to low percentage of infestation, no dusting was done on any part of the plot.

COTTON FERTILIZER EXPERIMENTS, WITH AND WITHOUT DUSTING, FOR WEEVIL CONTROL.

(In cooperation with Dr. W. E. Hinds, Entomologist.)

Plot 2. Experiment Field.

Variety of Seed:—Wanamaker, Cleveland Big Boll, (1½ Bu. per acre).

Fertilization Scheme:

Acid phosphate and nitrate of soda, ratio 2 to 1, in amounts of 300, 600, and 900 pounds per acre on plots as shown below, without potash. Balance repeated as above with addition of potash, (muriate) at rate of 25, 50 and 75 pounds per acre. Where amount of nitrate of soda is greater than 200 lbs., one-half was applied ahead of planting, in drill, balance applied ahead of first sweeping after chopping.

Weevil Control:

By regular dusting, after 10% infestation, applied to central portion entire area, leaving end fourths as undusted checks.

Check on fertilization: Four outside rows on each side of plot, extending full length of field.

Plots consist of 8 in number, of four rows each, 36 inches apart.

Plot 1.	Unfertilized (Check)	1266.30
2.	Acid phosphate 200 lbs., nitrate of soda, 100 lbs. per acre	1317.26
3.	Acid phosphate 400 lbs., nitrate of soda, 200 lbs. per acre	1336.30
4.	Acid phosphate 600 lbs., nitrate of soda, 300 lbs. per acre	1406.30
5.	Acid phosphate 200 lbs., nitrate of soda, 100 lbs. per acre. Potash 25 lbs. per acre	1336.30
6.	Acid phosphate, 400 lbs; Nitrate Soda, 200 lbs., Potash, 50 lbs. per acre	1343.30
7.	Acid phosphate, 600 lbs; Nitrate of soda, 300 lbs., Potash 75 lbs. per acre	1456.26
8.	Unfertilized (Check)	1323.63

VELVET BEAN VARIETIES IN CORN.

Plots 4 and 5. Experiment Field.

The corn on this plot was planted March 31st. Yielded at rate of 20.73 bushels per acre.

Beans, as shown below, were all planted between corn rows, six feet apart, April 16th.

No.	Variety	Source of Seed.	Yield per Acre, Bu.
1.	Osceola	Everett Seed Co., Atlanta, Ga	11.
2.	90 Day	Everett Seed Co., Atlanta, Ga	13.
3.	Osceola	T. W. Wood & Son, Richmond, Va	8.54
4.	Bunch	T. W. Wood & Son, Richmond, Va	6.34
5.	Extra Early	H. G. Hastings, Atlanta, Ga	18.32
6.	Bush	H. G. Hastings, Atlanta, Ga	5.
7.	Osceola	Chris Reuter, New Orleans, La	10.
8.	Early Speckled	Chris Reuter, New Orleans, La	15.
9.	Early Bunch	Chris Reuter, New Orleans, La	6.
10.	Tracy's Early Black	U. S. Dept. Agr., Washington, D. C.	10.
11.	Early Arlington	U. S. Dept. Agr., Washington, D. C.	13.

Most of the above varieties were later maturing than usual, due to abnormal dry weather during growing period, and were injured by frost.

CORN VARIETY TESTS.

Plot 6. Experiment Field.

No.	Variety	Source of Seed.	Yield per Acre, Bu.
1.	Surcropper	Ferguson Seed Farm, Sherman, Tex.	26.10
2.	Yellow Dent	Ferguson Seed Ferm, Sherman, Tex.	27.45
3.	Chisholm	Ferguson Seed Farm, Sherman, Tex.	26.40
4.	Calhoun Red Cob	I. L. Haile, Linville, La.	21.30
5.	Big Ear Prolific	Dr. L. C. Allen, Hosston, La.	21.
6.	Stewart's Yellow Dent	N. W. Stewart, Plain Dealing, La.	21.90
7.	Imperial White Dent	Raceland Co., Raceland, La.	9.45
8.	Neal's Paymaster	W. H. Neal, Lebanon, Tenn.	25.50
9.	Rogers	D. H. Wallace, Verda, La.	18.60
10.	Whatley's Prolific	Whatley Bros., Helena, Ga.	21.15
11.	Smith's White Dent	E. W. Smith, Calhoun, La.	21.30
12.	Sentell's White Dent	J. M. Sentell, Dixie, La.	23.40
13.	Yellow Calhoun	State Experiment Station, Baton Rouge	19.05
14.	White Calhoun	State Experiment Station, Baton Rouge	22.50
15.	Red Calhoun Cob	State Exp. Station, Baton Rouge	21.90
16.	Calhoun Red Cob	N. La. Experiment Station, Calhoun	24.00

All of the above varieties were planted March 31st, after applying 200 pounds of acid phosphate and 50 pounds of nitrate of soda in drill; was given clean, shallow cultivation until beginning to tassel. Nitrate of soda was applied May 25th, when corn was about average shoulder high; 75 pounds of nitrate of soda was used per acre.

Damage by worms and weevils not here considered.

COTTON VARIETY TESTS.

Plot 7. Experiment Field.

No.	Variety	Source of Seed.	Bolls Per lb.	Lint %	Lbs. Per A.
1.	Cook 588	T. J. Whatley, Opelika, Ala.	70	35.51	894.90
2.	Salsbury	Delta & Pine Land Co., Scott, Miss.	78	30.70	780.
3.	D. P. L. No. 4	Delta & Pine Land Co., Scott, Miss.	74	27.44	812.40
4.	D. P. L. No. 5	Delta & Pine Land Co., Scott, Miss.	69	31.58	717.60
5.	Cokers Ltng. Exp.	Pedigreed Seed Co., Hartsville, S. C.	78	31.09	780.
6.	Coker's Delta Webber 4	Pedigreed Seed Co., Hartsville, S. C.	64	26.77	732.60
7.	Coker's Webber 49-101-3-3	Pedigreed Seed Co., Hartsville, S. C.	79	32.46	729.80
8.	Coker's Clev. 1a3-13-3-9	Pedigreed Seed Co., Hartsville, S. C.	67	35.00	845.10
9.	Ped-Cleveland No. 3	Piedmont Ped. Seed Co., Commerce, Ga.	70	33.76	815.10
10.	Coker's Htsville 20	Pedigreed Seed Co., Hartsville, S. C.	64	27.54	785.10
11.	Wanamaker Big Boll	W. W. Wanamaker, Jr., St. Matthews, S. C.	75	36.51	755.10
12.	Cook 588	R. E. Hudson, Auburn, Ala.	72	35.66	810.
13.	Covington-Toole Wilt Resistant	W. F. Covington, Headland, Ala.	71	33.13	825.

14. Half & Half No. 92—Dr. C. C. Craighead, Athens, La.	64	42.59	792.60
15. Half & Half No. 27—Dr. C. C. Craighead, Athens, La.	71	43.62	879.90
16. Wanamaker-Clev. BB.—N. La. Exp. Station, Calhoun, La.	66	33.75	817.50
17. College No. 1—State College Agr. Athens, Ga.	73	33.86	815.10
18. Mexican B. B.—N. C. Exp. Sta. Raleigh, N. C.	55	31.25	747.60
19. Louisiana 143—State Exp. Sta., Baton Rouge, La.	79	28.64	722.40
20. Louisiana No. 1—State Exp. Sta., Baton Rouge, La.	84	28.09	695.10
21. Alex. Wilt Res.—State Exp. Sta., Baton Rouge, La.	86	30.10	840.

All of the above varieties were planted April 17th, after applying 200 pounds of acid phosphate and 100 pounds of nitrate of soda in drill. Frequent cultivations were given until June 27th. All of the cotton was bunched instead of the usual thinning to one stalk. An application was given, as a side dressing, May 28th, after chopping and ahead of sweeping. Cotton picked October 5-6.

Length and quality of lint must be considered in estimating money value per acre.

DEMONSTRATION 3-YEAR ROTATION.

Area No. 1.

Previous crop: Cotton.

Present crop: Corn and Velvet beans.

Object: Comparison of yields per acre, following three year rotation of corn and velvet beans, corn and cowpeas or soy beans, and cotton, and the actual cost per acre of producing each crop.

Cost of Producing Crop	Total	Per Acre
Rebuilding terraces, preparation of soil and planting	$ 80.38	$ 5.02
Fertilizer, Acid phosphate, $25.20, nitrate soda, $40.50	65.70	4.11
Seed, Corn, $11.00; Beans, $24.00	35.00	2.19
Cultivation and harvesting	128.88	8.06
Total cost of producing crop	$309.96	$19.38

	Total	Per Acre
Corn harvested December 4-8, bushels	377.33	21.08
Value of crop, @ $1.25 per bushel (corn)	$471.66	$29.48
Less cost of producing crop	309.96	19.38
Balance	$161.70	$10.10

Every third row was planted to velvet beans, which made pretty fair growth, but due to adverse weather conditions, the seed pods were shed badly, and those adhering were rotted by excessive rains during the fall, so the bean yield is not figured in.

DEMONSTRATION 3-YEAR ROTATION.

Area No. 2. (13 acres.)

Previous crop: Corn.

Present crop: Cotton.

Cost of Producing Crop	Total	Per Acre
Rebuilding terraces, preparation of soil and planting, ...	$ 63.18	$ 4.86
Fertilizer, Acid phosphate, 2,600 lbs. (200 lbs. per Acre)	40.80	3.14
Nitrate of Soda, 3,042 lbs. (234 lbs. per acre)	82.13	6.32
Seed, 900 lbs. @ $3.00 per 100 lbs.	27.00	2.08
Cultivation of crop	136.01	10.46
Harvesting 15,311 lbs. @ $1.00 per hundred	153.11	11.77
Ginning, bagging and ties, approximately 10 bales..	70.00	5.39
Total cost of producing crop...................	$572.23	$44.02

Value of 5,402 lbs. line @ 18c per lb......	$ 972.36	
Value of 9,909 lbs. seed @ $30.00 per ton..	148.63	
Total value of crop..............	$1,120.99	
Less cost of production..........	572.23	
Balance	$ 548.76	Per Acre...$42.21

The above cotton was planted April 10-11, on bed; 200 lbs. of acid phosphate was applied and bedded on March 4-6. Bed opened, and 100 lbs. of nitrate of soda applied ahead of planting. Wanamaker-Cleveland Big Boll was variety of cotton used, at rate of 1½ bushels per acre.

After chopping an additional 100 lbs. of nitrate of soda per acre was applied, as a side dressing. Frequent cultivations were given until June 27th. First cotton picked August 19th.

DEMONSTRATION 3-YEAR ROTATION.

Area No. 3. (8 acres.)

Object: Same as areas 1 and 2.

Cost of Producing Crop.	Total	Per Acre
Rebuilding terraces, preparation of soil and planting.	$ 22.13	$ 2.77
Fertilizer: Acid Phosphate, $14.40; Nitrate Soda, $12.88	27.28	3.41
Seed: Corn, $7.00; Peas, $16.00....................	23.00	2.88
Cultivation of crop	31.25	3.91
Harvesting corn, 153.69 bushels; 19.21 bu. per acre..	17.25	2.16
Total cost of production and harvest........	$120.91	$15.13

Value of corn crop: 153.69 bu. @ $1.25	$192.11	$24.01
Less expense of production and harvesting	120.91	15.13
Balance on corn crop	$ 71.20	$ 8.88

Cowpeas were planted in drills in corn middles, June 1st, and a good stand secured. An average crop of peas matured but were all ruined by the continued rains in the fall, before they could be harvested.

DEMONSTRATION 3-YEAR ROTATION.

Area 3, continued. (10 acres.)

Previous crop: Corn.

Present crop: Corn, Soy Beans, and Cowpeas.

Cost of Producing Crop.	Total	Per Acre
Rebuilding terraces, preparation of soil and planting	$ 52.50	$ 5.25
Fertilizer: Acid Phosphate, $18.00; Nitrate Soda, $17.00	35.00	3.50
Seed: Corn, $6.00; Beans, $15.00; Peas, $4.50	25.50	2.55
Cultivation	50.50	5.05
Harvesting corn, 123.2 bu., 12.32 bu. per acre	21.30	2.13
Harvesting beans, 4,000 lbs. @ 80c	32.00	3.20
Total cost of producing and harvest	$216.80	$21.68
Value of corn: 123.2 bu. @ $1.25	$154.00	$15.40
Value of soy beans, approximately 40 bu. @ $3.00 bu.	120.00	12.00
Total cost of production and harvest	$216.80	$21.68
Less cost of production, etc.	216.80	21.68
Balance	$ 57.20	$ 5.72

Approximately one-half of the field was planted in corn, in rows six feet wide, with a row of Biloxi soy beans between corn rows, planted at the same time as the corn, March 30th. One-third of the balance of the area was in peas in the drill with the corn at first sweeping; the other two-thirds of the balance was planted in the same way with Mammoth Yellow soy beans. The peas made a good yield but were ruined by rains. The Mammoth Yellow soy beans produced about 3 bushels per acre. The Biloxi soy beans of March 30th, planting produced at the rate of 8.05 bushels per acre, and were injured very little by the rains that ruined the peas.

WEATHER REPORT.

(1925)

North Louisiana Experiment Station.

Month	Max. Temp.	Min. Temp.	No. Days Rain	Inches Rainfall
January	72	21	11	8.06
February	82		2	1.70
March	84	32	6	4.37
April	92	42	1	.02
May	96	38	4	1.90
June	104	64	3	3.43
July	104	64	4	5.03
August	102	62	1	.14
September	108	64	7	5.52
October	92	33	8	9.02
November	78	31	10	12.66
December	76	15	6	2.76
Total rainfall for year				54.61

RICE EXPERIMENT STATION.

CROWLEY, LA.

J. MITCHELL JENKINS, Superintendent of the Station and Assistant Agronomist, Office of Cereal Investigation, Bureau of Plant Industry, United States Department of Agriculture.

METEROLOGICAL OBSERVATIONS.

The excessively dry weather referred to in the report of this Station for the year 1924, continued, with few interruptions, until the latter part of August, 1925. The precipitation was normal for the months of January, March, and June, and was far below normal for the months of February, April, May, July, and the first three weeks of August. During September and October the rainfall was excessively high, while for the last two months it was decidedly below the average.

The annual precipitation amounted to 49.86 inches, which is 5.41 inches less than the average annual for the past sixteen years. The average mean temperature for the first five months was 69°F., or 9°F greater than for the same period last year, while the average mean for the remaining seven months was 74°F, or only a fraction of a degree greater than for the same period last year.

During January and February the temperature did not go below 30°F. The lowest temperature during the year occurred December 28th, with a reading of 21°F. Only once during the summer did the temperature reach 100°F: This was on August 20th.

THE EFFECT OF THE WEATHER ON LIVESTOCK

Relatively mild weather during January and February was of great value to livestock, especially to cattle. The temperature was such as not to produce much discomfort and this, with the rains, caused a decided growth of grass in protected areas. There was also better provision made this year by the owner for the care of his animals, than was the case last year.

During the summer it became necessary for many farmers to bore mediumly deep wells to provide water for their stock because of the failure of shallow wells and the excessive amount of salt in the water of the streams.

The problem of feed was not as serious as during the summer and fall of 1924, because of the larger amount of precipitation this year and its more even distribution during the dryer periods.

THE EFFECT OF THE WEATHER ON THE RICE CROP OF SOUTHWEST LOUISIANA.

In spite of the fact that five inches of rain fell during January, tests of water from some streams used for irrigation purposes made the latter part of February, indicated a salt content as high as twenty-four grains per gallon. A very heavy rain of 3.36 inches, March 16th, resulted in no salt being found at these points when tests were made March 24th. The salt content in the water of these streams increased each month thereafter, and by the 25th of May, tests indicated as much as 280 grains per gallon; tests made June 24 indicated as much as 500 grains per gallon; and by the same date in July 670 grains per gallon were found. After a heavy rain of over four inches, August 22, tests made September 30 indicated as much as 665 grains. As late as November 10, after the very heavy rains of September and October, there was still as much as 5 grains noted. There were other streams that received no supply of fresh water until late in the fall. This condition in the irrigation situation caused much unrest among farmers. However, they went forward with their plowing and seeding operations and as the weather was favorable much of the crop was seeded earlier than usual. Some felt that early planting would be best in case of shortage of water later in the season. In many sections there was not sufficient moisture in the soil to germinate the seed. To overcome this, water was pumped upon the fields to wet the soil and then drained off. This necessitated early pumping from the streams, and the utilization of water at a much earlier date than is usually the case. In some sections the water that was used for this purpose contained sufficient salt to kill the seedlings as fast as germination took place. In some instances land that was flooded last season with water that contained a high salt content, was seeded again this season, to be irrigated with well water. Upon flooding it was found that enough salt had remained in the soil to injure or kill the young plants.

As the season advanced and there was no change, especially during July and August, there was much doubt among farmers and canal owners as to what course to pursue, with the result that some used water containing salt sufficient to kill or seriously injure the crop, while others thinking of the effect on the soil, allowed their crops to suffer on account of the lack of water rather than injure both the crop and the soil with salt water.

Early maturing rices in most cases, had sufficient water to produce normally. However, much of the late maturing portion of the crop suffered partial or total loss. In some instances crops that suffered for water produced nearly normal yields, as the result of heavy rains the last week in August.

Certain canal companies conveyed water long distances to help relieve the situation and most deep wells operated day and night during the entire season in order to irrigate the largest possible acreage.

After producing the crop under such unfavorable conditions, it appeared for awhile in September and October, that the rainy weather would prevent its harvest; however, this was eventually accomplished with less loss than was at first anticipated. In the end it resulted in high prices and a good profit for some and total failure for many.

RESULTS OF EXPERIMENTAL WORK.

The adverse weather conditions discussed above affected very little, the experimental work of the Station. The good weather during December of last year, permitted the greater part of the plowing operations to take place before the beginning of this year. This allowed long exposure of the soil to the action of the air and frost, resulting in good seedbed preparation, good germination, and, in the main, good results.

The deep well afforded ample water for irrigation purposes, although the level of water went to a point below the pump about the middle of May and did not rise above the pump until the latter part of November. Repairs made on the pump last year are responsible for its successful operation this year.

The same lines of investigation were pursued as have been reported for the past several years.

The yields from rices in the increase plats were, on the whole, greater than from the same varieties last season. The yields from certain new varieties are very satisfactory, and indicate promising early maturing rices. There was a ready sale of all seed of several varieties grown.

The result in the rate of seeding experiments indicate that there is little, if anything, to be gained from the sowing of more than eighty pounds of seed per acre, provided the land is fertile and free from weeds.

Experiments in the manner of seeding indicate that under favorable conditions there is a slight gain in favor of the broadcast method.

The best results in the date of seeding experiments were secured from the April and May seedings, there being very little difference in favor of the latter date. The high temperatures of early spring no doubt account for the similarity in the results.

Results secured from commercial fertilizers give no conclusive evidence that plant food supplied in this form to rice is profitable. In some plats increases are noted, while in check plats cropped continuously to rice for seven years, greater yields are recorded.

In the rotation experiments, there is no doubt as to the advantage derived from the use of the soybean in this connection. Many yields of rice grown in rotation with soybeans are greater by far than anything secured from commercial fertilizers, and in some instances, three times as great as the average production of rice for southwestern Louisiana.

The yield of soybean seed was much greater than last year, due to favorable conditions at seeding time, and to rain at the time of fruiting.

EXTENSION OF STATION RESULTS.

Interest in the work of the Station was greatly increased during the year, as indicated by the number of inquiries received and the number of visitors entertained. The main points of interest were centered around the growing of soybeans, the use of commercial fertilizer for rice, and the use of improved seed.

The Extension Division of the University, through its specialist in rice, having his headquarters at this Station, did much during the year to strengthen the recommendations of the Station by conducting demonstrations on farms throughout the rice-growing region and by dissemination of knowledge along other lines.

ENTOMOLOGICAL WORK.

The representative of the Bureau of Entomology of the United States Department of Agriculture, located at this Station, continued his investigations pertaining to rice insects, and also devoted much time to a study of the blister beetle that attacks so ravenously the soybean, with the view of working certain phases of its life history and means of control. He was successful in establishing, beyond a doubt, the effectiveness of sodium fluosilicate as a means of destroying this insect. This discovery has given great impetus to the soybean industry as the blister beetle was fast discouraging many from attempting to grow this crop.

PUBLICATIONS.

In October, the Office of Cereal Investigations, Bureau of Plant Industry, United States Department of Agriculture, published, in cooperation with the Louisiana Agricultural Experiment Station, Department Bulletin No. 1356, entitled:

"Experiments in Rice Production in Southwestern Louisiana," by Charles E. Chambliss, Associate Agronomist in Charge of Rice Investigations, Bureau of Plant Industry, and J. Mitchell Jenkins, Superintendent, Rice Experiment Station, Crowley, La., and Assistant Agronomist, Office of Cereal Investigations, Bureau of Plant Industry.

This bulletin discusses natural factors affecting rice production and gives the results of certain lines of investigation at this Station over a period of fourteen years.

MALARIA INVESTIGATIONS.

The unit of the United States Public Health Service, investigating malaria under rice field conditions, discontinued its work here the end of February and removed its headquarters to Greenwood, Mississippi.

The results of the investigations of this unit of the Public Health Service offer an explanation as to the reason for the excellent health that obtains in the rice-growing region of the State. Mosquitoes were found in abundance but during the two years of investigation very few were found infected with the organism that produce malaria.

FRUIT AND TRUCK EXPERIMENT STATION,

HAMMOND, LA.

B. SZYMONIAK, Horticulturist in Charge.

Fertilizer Test For Strawberries.

Thirty-five thousand plants of the Klondike variety were set out during the latter part of November, 1924. The strawberry plants were spaced one foot apart in rows three and a half feet apart. Twenty-one mixtures of fertilizers were used, as in the past two seasons. The amounts of fertilizers were doubled the amount used during the past two seasons. The following table shows the amount and kind of fertilizers applied per acre:

Combination No.	Lbs. Acid Phosphate 16%	Lbs. Nitrate Soda 14.8%	Lbs. of Sulphate Potash	Yield Crates
1	1200	0	0	78
2	960	0	90	81
3	960	240	0	92
4	720	0	180	70
5	720	240	90	120
6	480	480	0	81
7	480	0	240	71
8	480	240	150	68
9	480	480	90	70
10	480	720	0	60
11	240	720	0	60
12	240	240	240	68
13	240	480	150	61
14	240	720	90	50
15	240	960	0	51
16	0	0	450	50
17	0	240	330	35
18	0	480	240	35
19	0	720	150	20
20	0	960	90	20
21	0	1200	0	20
Check				36

The above table shows that combination No. 5, consisting of 720 pounds of acid phosphate, 16%; 240 pounds of nitrate of soda, 14.8%; and 90 pounds of sulphate of potash, gave the highest yield of marketable fruit—120 crates of 24 pints each. These mixtures were repeated five times. The yields are slightly higher than last year, due to increased amounts of fertilizers used and the building up of the fertility of the land. It will be further noticed that where higher quantities of phosphate fertilizers were used, the yields increased. There were only 25% of culls on rows with higher applications of phosphate, as compared with 50% on the other rows. The fruit was of larger size and firmer texture on the rows with phosphate.

Strawberry Variety Test.

Object was to compare and test varieties of strawberries with the Klondike, with reference to yields and maturity. The following varieties were tested: Missionary, Gandy, Aroma, Lady Cornellie, Evening Star, Premier, Texas, Nick Ohmer, and Excelsior. All of the varieties, without exception, died due to the dry hot summer of 1923 and 1924. The Klondike variety was the only variety that withstood the adverse climatic conditions. We have therefore no results on yields for this season; the crop resulted in a total failure.

Muscadine Grape Culture.

The object of the test is to determine the practicability of commercializing the production of Muscadine grapes. This is the third season of their growth.

A cover crop of cowpeas was grown during the summer and an application of 200 lbs. of 16% acid phosphate was given in March, 1924. A crop was set during the summer of 1925 but owing to the droughth, a good deal of the fruit dropped off. The grapes ripen in August and September.

The vines were pruned with the Kniffin System, six arms on a trellis of three wires. They made a vigorous growth in spite of the dry weather.

Blackberry Culture. (A supplementary crop to the strawberry crop).

The MacDonald variety interplanted with the Lucretia dewberry, was used. They received a liberal application of barnyard manure during the spring, and were cultivated four times. A heavy crop of fruit was set during the spring of 1925, but owing to the droughth, most of the fruit dried up on the bushes. The total amount harvested from one-half acre, was 34 crates and 16 pints, which sold for $55.38. Five crates were shipped to Chicago, and sold for $10.18; they were reported to have arrived in excellent condition. Difficulty was had in having them harvested. The strawberry pickers would not pick blackberries because of the thorns.

Rotation for Strawberries.

The following rotation has been followed for the past season: Strawberries followed by corn and cowpeas, followed by a crop of soybeans. The cowpeas have not been satisfactory in the corn; they have not made sufficient growth. The soybeans gave about a ton and a half of hay and were more satisfactory than the cowpeas.

Satsuma Orange Culture.

One hundred Satsuma trees were set out in the spring of 1925. Owing to the dry weather, only thirty-five trees lived through the past summer. They were mulched with barnyard manure and received frequent cultivation.

Pecan Culture. (Pruning to stimulate fruitfulness).

Not sufficient growth was made in the past three summers to prune the trees; therefore no results are available.

Stocks for Pecan Grafting.

The seedlings are not large enough for grafting. The seasons have been adverse for the growth of the seedlings; they have not made uniform growth on that account.

The summers of 1923 and 1924 were very dry and unfavorable for the crops.

DR. W. H. DALRYMPLE.

Dr. Dalrymple came to Louisiana as Professor of Veterinary Science at Louisiana State University, and Veterinarian of the Experiment Stations in 1889. He was a native of Scotland, a graduate of Stranraer College and of Glasgow Veterinary College. He was a member of the Royal College of Veterinary Surgeons. In 1888 he was made a member of the Veterinary Staff of the Irish Privy Council, of Dublin, an honor in which he always took just pride. In 1893 he resigned from the University, spent a short period in England and Scotland, but returned to Baton Rouge to practice the profession of Veterinary Medicine. In 1897 he again entered the service of the University, and so continued up to the time of his death, July 17, 1925. During a period of nearly two years, 1919-21, he was Dean of the College of Agriculture and Director of the Experiment Stations. Failing health made it necessary for him to be content with lighter duties.

Dr. Dalrymple's principal contribution to agricultural literature were on Texas fever of cattle, internal parasites of sheep, charbon or anthrax, livestock sanitation, and live stock obstetrics. He was for many years Editor of the livestock and agricultural page of the weekly issue of the Times-Picayune, New Orleans, and for a considerable period, edited and published the Journal of the American

Veterinary Medical Association. He was a fluent writer and contributed liberally to the current literature of themes that interested him. He was always justly proud of his success in inducing the City Council of Baton Rouge to construct a modern abattoir and meat inspection system, which has been used as a model by many other enterprising cities.

Dr. Dalrymple was a member of a long list of scientific and agricultural societies. He sponsored the legislative bill creating the Louisiana Livestock Sanitary Board, and did much to make the work of the Board effective. He was universally loved by those who knew him best. He was public spirited and took an active part in local church and civic activities. The influence of his scholarship will have an influence on the Experment Station work and upon Veterinary Science, for a long time,

Dr. Dalrymple's private library of several hundred volumes, was donated by Mrs. Dalrymple to the Louisiana State University.

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ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

FOR 1926

TO THE GOVERNOR

BY

W. R. DODSON, Director

EXPERIMENT STATION STAFF.

W. R. Dodson, A. B., B. S., Director.
W. G. Taggart, B. S., Assistant Director,
C. W. Edgerton, Ph. D., Plant Pathologist,
Eugene C. Tims, Ph. D., Ass't. Plant Pathologist,
H. H. Flor, M. S., Ass't. Plant Pathologist.
Harry Morris, D. V. M., Bacteriologist and Veterinarian,
W. E. Hinds, Ph. D., Entomologist,
Herbert Spencer, Ph. D., Ass't Entomologist,
B. A. Osterberger, B. S., Assistant in Entomology,
C. L. Stracener, Assistant in Entomology.
Nathalie Poirrier, Stenographer, Dep't. of Entomology.
J. F. Brewster, Ph. D., Research Chemist,
Wm. L. Owen, B. S. Research Bacteriologist.
D. N. Barrow, B. S., Sugar Cane Specialist,
C. B. Gouaux, B. S., Sugar Cane Specialist.
H. J. Rodriguez, B. S., Assistant in Sugar Cane
J. J. Munson, B. S. Sugar Engineering.
C. L. Osterberger, B. S., Farm Machinery.
F. C. Old, B. S., Poultry Specialist.
G. W. Knox, Jr., B. S., Ass't in Poultry.
H. B. Brown, Ph. D. Cotton Breeding.
P. J. Mills, B. S., Ass't. in Plant Pathology.
A. P. Kerr, M. S., Chief Chemist.
W. P. Denson, B. S., Assistant Chemist,
C. C. Moreland, B. S., Assistant Chemist.
J. H. Jolly, B. S., Assistant Chemist.
Jesse L. Farr, M. S., Assistant Chemist.
C. R. Hummel, B. S., In Charge of Records.
Mrs. Ruth Heidelberg, Secretary to the Director.
J. K. McHugh, Librarian.
D. J. DeArensbourg, Farm Overseer.
North Louisiana Experiment Station, Calhoun, La.
Sidney Stewart, B. S., Superintendent.

Rice Experiment Station, Crowley, La.

J. Mitchell Jenkins, B. S., Superintendent.
Helen Andrus, Stenographer.

Fruit and Truck Experiment Station, Hammond, La.

B. Szymoniak, B. S., Horticulturist in Charge.

FINANCIAL STATEMENTS

The financial statements include receipts and expenditures for the calendar year 1926, for all funds. The Federal fiscal year ended June 30, 1926 for Federal funds. That comparisons may readily be made with Federal reports, the receipts and expenditures of all Federal funds have been tabulated for the fiscal year, July 1, 1925 to June 30, 1926.

The books and vouchers have been examined at each period of six months by the Auditor of Public Accounts and reports made to you regarding such audits. The accounts were found to have been correctly kept and proper vouchers accompanying checks representing all expenditures.

A representative of the Office of Experiment Stations, United States Department of Agriculture, Washington, D. C., has audited the accounts also for the Federal Funds, and approved the expenditures for their fiscal year, ending June 30, 1926.

SPECIAL FUNDS

In the spring of 1926, the American Sugar Cane League paid three hundred dollars of the expenses of conducting cane borer investigations, until the special appropriation of the Legislature became available. In order that a full season's observation might be made it was necessary to begin work before the Legislative Act became effective. While this sum is small in itself, it came at a critical period. Its significance is greater however, in that it was a manifestation of the sugar planters' desire to see this work go forward without delay.

The American Cyanamid Company established a research scholarship of two thousand dollars a year for two years, for a study of the effect of cyanamid, applied in various ways and in varying amounts to sugar cane and cotton. The supervision of the experiments and the compilation of the data therefrom has been assigned to Dr. C. W. Edgerton, of the Experiment Station Staff. The funds for the scholarship are paid to the Treasurer of the University and are not passed to the Experiment Station account. Land, labor, and plant cane for the experiments conducted here are furnished by the Experiment Station, and a brief summary of the work is here included.

STATE FUND.

The State appropriation for Experiment Stations is for the maintenance of the Rice Experiment Station at Crowley, the Fruit and Truck Experiment Station, at Hammond, the North Louisiana Experiment Station at Calhoun, and the State Station and Sugar Station, at Baton Rouge. This, then, gives about eight thousand dollars, plus the sales, for the maintenance of the work at each Station. The fund is divided approximately equally between them.

Most of the State fund is expended on field tests, laboratory investigations being provided for with funds from the Federal appropriation. There is, of course, some overlapping of work as field experiments are required in some of the strictly technical investigations. There is no necessity for keeping the projects absolutely separate, as the purposes for which the funds are appropriated are similar.

The expenses and salary of Dr. W. E. Hinds are paid from this fund but his report appears elsewhere. Part of the general expense for office work is included under this fund.

Special Appropriation for Sugar Cane Investigations.

The unprecedented ravages of the sugar cane moth borer during the season of 1925, with the increased losses from sugar cane diseases and the very poor condition of the cane crop in the spring of 1926 created an emergency in the cane industry that called for more research work than could be provided for with available funds of the Experiment Stations.

The American Sugar Cane League, the late Governor Henry L. Fuqua, and the President Pro Tem of the Senate, Phillip Gilbert sponsored a bill in the Legislature of 1926, providing additional funds for research work on the cane borer problem, and upon fungus diseases injurious to cane.

A special appropriation of twenty-five thousand dollars for the year 1926-27 and the same amount for 1927-28 was secured. Money from this fund became available July 1, 1926. Anticipating this appropriation, with the approval of Governor Fuqua, we materially enlarged our plants for investigations on the cane borer and cane diseases in the early spring, so as to secure a full season's work on these problems.

An Advisory Committee, to be appointed by the President of the American Sugar Cane League, to work with the Experiment Stations in evolving and executing plans for this work was provided for, in the Appropriation bill. The following sugar planters were appointed to serve on this Committee:

Mr. A. W. Wallace, Cinclare, La., Chairman.
Mr. Chas. Krumbhaar, Houma, La.
Mr. J. Numa Thibaut, Napoleonville, La.
Mr. C. D. Kemper, Franklin, La.

This Committee has been very helpful to the Experiment Station Staff in that they have taken their appointment seriously and have given of their time freely, and have travelled at their own expense to attend meetings for discussion of the best means of aiding the progress of the investigations agreed upon.

A budget of the funds planned for expenditures for the fiscal year, July 1, 1926 to June 30, 1927 as follows:

Sugar Cane Moth Borer Investigations	$14,000.00
Sugar Cane Diseases	6,000.00
Extension Work & Test Field Supervision	5,000.00
Total	$25,000.00

Reports of progress in these several lines of work are given by members of the Staff, under appropriate divisions of this publication.

As the planters are anxious to get all available information on the serious sugar cane problems as soon as possible, I have asked for fuller reports on these activities than are usually given in an Annual Report, which is intended to be a report of progress rather than a compilation of experimental data, that might await further confirmation and final publication in bulletin form.

We believe some real progress is being made toward the broadening of our knowledge of the difficult problems involved, and that this knowledge will be materially helpful in lessening the losses from cane borers and sugar cane diseases, or even in controlling some of these maladies.

With reasonable control over the cane borer, and the use of canes resistant to the diseases that have proven so destructive to the unselected old canes, we should expect restoration of the cane industry to a profitable basis.

The Sugar House

The sugar house equipment is now a part of the Department of Mechanical Engineering of the University, available alike for teaching students of Engineering, of the Audubon Sugar School, and for experimental work, or for use in any other way that it may be made to serve the sugar industry. We probably have here now, the best equipment there is to be had anywhere for general experimental work in sugar house operations, on both sugar cane and sugar beets. Mr. J. J. Munson has kindly prepared, at my request, a statement summarizing the improvements made in the sugar house. This statement by Mr. Munson is here inserted for your information and for historical record.

The following is a report by J. J. Munson on Improvements made in the Sugar House during 1926.

"Since the small sugar house was moved from Audubon Park, New Orleans, to the University property at Baton Rouge, considerable improvements and additions have been made. In fact very little of the equipment that was in the plant at New Orleans was used in the new sugar house at the University. The small double effect evaporator and coil pan together with a few pumps were carefully repaired and placed in service at our new factory.

The following list of equipment was purchased new and has been installed:

2 scales, together with tanks for weighing juice, both from beets and cane.

1 juice receiving tank under scales.

1 Centrifugal pump for pumping juice through heater.

1 horizontal juice heater.

1 lime mixing tank with independent motor drive.

6 carbonatation tanks for clarification of cane and beet juices.

2 juice receiving tanks for filter press pumps.

1 Centrifugal pump for pumping juice through filters.

2 24″ plate and frame filter presses.

1 clear juice receiving tank.

1 clear juice pump for pumping to evaporators.

1 triplex syrup pump.

1 syrup tank.

3 compartment molasses tanks.

2 counter-current barometric condensers, one for pan, from Audubon Park and one for double effect evaporator.

1 5 foot coil pan together with condenser and auxiliaries.

1 vertical and 1 horizontal vacuum pumps.

2 Crystallizers, water-jacketed.

1 Hoist arranged on lime kiln tower, consisting of a 5 ton Shepard hoist and wooden car.

1 Tower, which also supports the lime kiln and its platform is of structural steel.

1 Lime Kiln.

2 Weston centrifugals, complete with mixer, etc., Complete sugar handling equipment, consisting of scroll under centrifugal, sugar elevator, and belt carrier.

1 Granulator complete.

1 re-melt Tank for melting low grade sugars.

Complete beet handling equipment, consisting of carriers, and elevator.

1 Beet Washer.

Beet scale.

Beet Slicer of 100 tons daily capacity.

Diffusion Battery, 12 cells, 100 tons capacity.

Pulp flume and pulp carrier for handling exhausted chips.

In addition, a cane elevator has been installed outside over the railroad track for the purpose of transferring cane from wagons to cars. This hoist is electrically operated and has a capacity of 3 tons. It was used during the last season for transferring cane.

A concrete floor has also been installed in the mill room and boiling house. This floor is on the ground level and is completely equipped with floor drains so that the entire lower floor of the sugar house may now be kept in good condition.

There was $10,000 set aside by the Building Committee for the purpose of moving the Audubon sugar house equipment and installing it here in our new plant. In 1925-26, $27,000 was spent in equipping the sugar house for handling beets. In addition to this, the University set aside approximately $18,000 for the purpose of buying a vacuum pan, centrifugal, granulator, and some other additions that were necessary in order to put the plant in first class condition for making beet sugar. All of this equipment is given in the list above.

Practically all of this money has been spent and the plant is now practically complete. It is expected that from 2000 to 3000 tons of beets will be sliced during the spring.

At present the sugar house is equipped to do most any kind of experimental work. We have already cooperated with the Darco Corp. in making some tests of their char. We have done considerable experimenting on the manufacture of cane table syrup, the results of which are given in a separate report. We will probably work with several other companies making clarification materials in carrying on further tests relative to sugar and syrup manufacture. A number of these companies have already made inquiries as to the extent of our equipment and the possibility of carrying on this work. It is believed that this will not only be beneficial to the sugar and syrup manufacturing concerns of the State, but it will also be a means of giving students valuable instruction while here at the University."

Field Day Meeting at Sugar Station.

Field Day was held July 20, 1926, at the Sugar Experiment Station. More people visited the field plats that day than have ever before been on the Experiment Station grounds in one day. We made no accurate count of the visitors but estimated the attendance at about six hundred,

Cooperation with the Office of Sugar Plant Investigations (U. S. D. A.)

The cooperation of the United States Department of Agriculture in the introduction of seedling sugar canes has been satisfactory to us. All sugar canes and cane seed introduced into the United States from other countries are kept in hot houses in Washington, D. C., by the United States Department of Agriculture, until it becomes apparent that no new diseases or insect pest accompanies the cane or seed. They are then sent to Canal Point, Florida for preliminary test. Seeds are also produced at Canal Point, Florida, germinated there and grown for a year and those that seem to have merit are sent to the Station here for test, at the same time that they are put on trial at the Government Station, at Southdown plantation, Houma, La.

We contribute from our funds, one thousand dollars a year toward helping to care for the seedlings at Canal Point; this is only a small part of what is spent there in this work.

The Stations are receiving the cooperation of the United States Department of Agriculture in other important projects. We furnish office and laboratory facilities and land and labor for truck crops, for entomological investigations and the United States Department of Agriculture pays the salary of the investigators. C. E. Smith has charge of this work. Similar arrangements are made for corn breeding work. Hugo Stoneberg has charge of this work.

We have made arrangements recently for placing here test areas for the Foreign Seed and Plant Introductions Division of the U. S. Department of Agriculture, in which they will place all new importations that they think may do well here.

Status of the Cane Sugar Industry.

The sugar cane crop of Louisiana, under normal conditions, is worth from thirty to forty million dollars per year, exclusive of syrup, molasses and bagasse. Crops supplementary to cane produced by cane growers will range from ten million dollars up.

It is conservative to say that the cane sugar industry normally produces from forty to fifty millions of dollars to be expended in the employment of labor, in sustaining local and regional commerce, and in helping to sustain local and state government institutions and public improvements. This year the value of the cane crop slumped to less than ten million dollars. The people of all the State are interested in maintaining the values of taxable property in the sugar territory, and in keeping the regions' population profitably employed, with the least possible interference with the industries of other regions.

It is probable, for instance, that if large areas of cane lands are devoted to rice, the results would be disastrous to the rice industry. Rice growers are, therefore, interested in maintaining cane production. If large areas were to be devoted to growing truck crops, the markets would be over-supplied and few, if any, producers would make expenses. People of the cities are interested in maintaining the markets afforded by the cane plantations. From the standpoint of the public welfare it is good business and good economics to have all the people interested in the speedy restoration of the sugar cane industry, if conditions are such as to warrant the public in having confidence in the safety of a program of restoration. We believe that such a program is offered in the utilization of the new varieties, and selected seed of old varieties of cane; seed cane selection, to be followed yearly, utilization of soy beans turned under as a preparatory crop to plant cane, and limiting cane planting to the better class of soils; the utilization of other soils to pastures, production of forage, etc., with a limited program of trucking, and the elimination of the cattle tick, so that a better quality of cattle may be produced.

There are more than twenty thousand acres of the new canes now planted. There are probably two thousand acres of selected Purple and Striped canes. There should be produced, under normal seasons, from four hundred thousand to five hundred thousand tons of these canes for the fall of 1927. This will be much more than enough to seed all the acreage desired for the crop of 1928, with these canes.

A few of the more forward looking planters, who still have some available reserve resources, are placing dairy cows in the hands of tenants, who are encouraged to develop the dairy industry as a supplement to cane production. We believe this is along the proper lines of diversification; hog and poultry production should accompany dairying.

In many instances, areas of plantations that have been unprofitable, on the average, in cane, could be devoted to beef cattle. Experiments at Baton Rouge and at the Iberia Live Stock Farm of the Federal Government have demonstrated that calves from six to eight months old, bringing top notch prices, can be produced at a low cost where there are no ticks and where good pastures have been established. Pastures of Bermuda grass and white clover on alluvial lands are of exceptional value for cattle grazing. Much of the cane territory is now tick free or nearly so; a few months of efficient work would complete the job.

When these possibilities are all taken into consideration, we think the future of the cane industry is now more promising than it has been at any time within the experience of this generation.

Cotton and Rice Situation: Outlook.

Many cotton growers who work on the tenant system and practice little or no diversification, have lost heavily the past year. The cotton farmers, who raise feed stuffs and rotate their crops are not in distress, though they have made little money. The depression in the price of cotton, due to a large surplus of this commodity, is responsible for the lack of prosperity of the exclusive cotton territory.

The rice grower is suffering from very much the same trouble as the cotton grower: there is too much rice and the price is not in adjustment with the prices of commodities that the rice grower must purchase.

Here again, it seems that the safest supplement to cotton growing or rice growing will be one or more lines of livestock production, and yet so far as cattle are concerned, the industry is not safe as long as the cattle tick is with us. We are doubtful of the permanent success of any diversified program of general application that does not include the eradication of ticks and the improvement of breeds of livestock. As long as we do not have a diversity of resources on the average farm we will have the greater hazard of recurring periods of depression, such as we are now suffering from.

Miscellaneous

The Director of the Stations was again asked to serve on the Advisory Council of the Agricultural Commission of the American Bankers' Association. No salary or per diem is received, but travel expenses are paid by the American Bankers' Association.

The American Bankers' Association spent thirty-five thousand dollars last year through its Agricultural Commission, mainly in supporting educational work fostered by the Agricultural Colleges.

The Director also continued to serve during the past year as Chairman of the Cotton Production Council of the Association of Southern Agricultural Workers. At a meeting of the Directors of Experiment Stations of eleven principal cotton producing states, and representatives of the United States Department of Agriculture, arrangements were made for correlating our investigations on the factors influencing the quality of staple of cotton, and to provide for some phases of these investigations not previously cared for by any of the Stations. Such cooperation will result in material economies, provide for a better balanced system of conducting such studies, and promote general interest of the specialists in these lines in correlating findings.

RECORD OFFICE

C. R. Hummel, Charge of Records

In addition to maintaining a complete file of projects carried on by the State Station and the branch stations over the state and a yearly progress report of each, the record office has kept an itemized inventory of all nonexpendable property having a replacement value of over one dollar. The inventory is carefully checked each year and all purchases added from the receipted bills. The following recapitulation of the inventories will show the value of all nonexpendable property as of July 1st, 1926, the end of the fiscal year.

RECAPITULATION OF ALL NONEXPENDABLE PROPERTY OWNED BY ALL BRANCHES OF THE LOUISIANA EXPERIMENT STATIONS

(As of July 1st, 1926)

Department and Location	Livestock	Tools and Implements	Apparatus	Libraries	Furniture and Fixtures	Miscellaneous	Totals
STATE STATION, Baton Rouge, La.							
Agronomy, field	1,635.00	1,710.80			41.00		3,386.80
Agronomy, office		6.90	187.60		190.16		384.66
Assistant Director, office					583.75		583.75
Bacteriology		12.00	2,141.20	26.70	136.50		2,316.40
Chemistry		6.80	3,070.24	11.00			3,088.04
Director, office		34.90	1,120.07	1,085.23	2,267.73		4,507.93
Entomology		324.03	985.43	167.50	901.65	230.00	2,608.61
Feed and Fertilizer Laboratory		47.75	4,675.21	83.86	1,399.05		6,205.87
Horticulture	25.00	44.50	25.00		94.00		188.50
Library				6,321.00	1,238.60		7,559.60
Miscellaneous			153.70	75.00	91.00		319.70
Pathology, Animal		9.67	657.59	69.50	277.87		1,014.63
Pathology, Plant		17.57	2,676.37	556.27	1,106.24		4,356.95
Poultry Plant			600.45				600.45
Record office		1.00		66.00	363.50	19.35	449.85
Sugar Extension		104.40			396.50		500.90
Sugar Farm	4,020.00	4,641.32	130.00			1,310.00	10,101.32
Sugar House		354.25	5,064.00		50.00		5,468.25
Total for State Station	5,680.00	7,315.89	21,486.86	8,462.06	9,138.05	1,559.35	53,642.21
NORTH LOUISIANA STATION, Calhoun, La.	1,660.00	2,376.25			533.30	920.00	5,489.55
RICE EXPERIMENT STATION, Crowley, La.	690.00	5,962.80	40.00	510.50	234.50		7,437.80
FRUIT AND TRUCK STATION, Hammond, La.	475.00	1,163.73	62.50		165.50	822.15	2,688.88
GRAND TOTAL FOR ALL STATIONS	8,505.00	16,818.67	21,589.36	8,972.56	10,071.35	3,301.50	69,258.44

NOTE: Expendable property not listed on inventory because of such great variability. Automobile tractors and trucks carried as miscellaneous. Library at North Louisiana Station not listed on inventory.

THE NORTH LOUISIANA
EXPERIMENT STATION,
Calhoun, Louisiana
Sidney Stewart, Supt.

GENERAL SUMMARY

The work carried on at this Station the past season consisted of practically the same projects as in 1925, the work consisting mainly of rotation experiments, variety and fertilizer tests with crops suited to this section, more attention being given to cotton and soy beans.

Cotton

An unusually good cotton crop was produced, averaging more than a bale to the acre. On the 29 acres cultivated in cotton was grown and harvested 40500 pounds of cotton, from which 30 bales of lint, averaging 498 pounds, were ginned.

Corn

From 40 acres of corn, 52158 pounds were harvested, producing at the rate of 18.57 bushels per acre. All of the corn had a leguminous crop grown with it, either in the drill, or on a row between the corn rows. On the areas where this plan is followed systematically, the yield per acre is being raised considerably, without the use of heavy applications of nitrogenous fertilizer.

Oats

From five plots of oats harvested, totaling 7.7 acres, 10.59 tons of cured, baled hay was produced, averaging a little more than 1½ tons per acre. The best yield was from Plot 2, North of the barns, which had Hairy vetch grown with the oats. This plot yielded at the rate of 2.78 tons per acre.

Small Grain

Two acres of Shallu (Egyptian Wheat) were planted in "Plot 2, South of Road." When in the dough stage, a severe wind storm, August 23rd., blew most of it down, ruining it, even for grazing, as it molded from being rained on. Enough was left standing to make an estimate of the probable yield, which was about 50 bushels of grain per acre.

The Delta Experiment Station, Stoneville, Miss., furnished us with enough Sagrain seed to use in our work this season, some of which was planted with the corn varieties, producing at the rate of 52.43 bushels per acre. Only the heads were harvested, which threshed out about 90% grain. The grain shatters very little; in fact, is very hard to thresh out clean, the opposite of which is Shallu's worst feature. We found Shallu very hard to harvest without losing a quantity of grain, from shattering.

Cattle

On account of the good rainfall during the summer months, the pastures have been good and the cattle are in fairly good order. A young Shorthorn bull was secured from the State University herd. Practically the entire herd is bred to him,several cows will calve within the next few weeks. No feeding has been necessary yet, as the fields have furnished good grazing for some time.

Farm Implements

Some additions have been made to the farming machinery the past year. Two Avery "Southern Queen" cultivators were bought and have been labor-saving implements. A majority of the cotton acreage was planted with a "Covington Cotton Dropper," which drops the seed in clusters of any desired amount of seed, spaced the desired distance apart. With the young cotton in this condition, chopping is reduced some. The operator should be very careful to see that the planter is adjusted properly at all times, as a stand can be ruined with an indifferent man handling the planter.

Boll Weevils and other Cotton Insects

No poisoning for weevils was necessary, as the infestation was never heavy enough, until after the crop was mature. Late blooms and forms in the top of the plants were full of grown weevils at the end of the season. The cotton in the "South Lee Field" and "Plot 3, North of Barn" was injured some by the Flea-Hopper. No especial injury was noticeable in the remainder of the cotton. Lice injured some sections and the cotton worm would have ruined the crop, if it had not been given heavy poisoning. Rains from August 13th, to 17th, every day, made it necessary to repeat, daily, poisoning of most of the cotton.

Pecans

Several pecan trees were broken badly by a wind storm, August 23rd., being heavily loaded at that time. The Success, Nelson and Senator varieties being most damaged. Caterpillars stripped two varieties before we noticed them, these trees being on the back side of the orchard. The nuts from these trees were immature and only partly filled out. Other varieties made a good yield, Money maker and Stuart doing best.

Buildings—Repairs

A new metal roof was put on the pavilion during the summer, being finished off with a combination cap and ventilator, which should add to the comfort of the building during hot weather.

The dwelling now occupied by Mr. Baker, is in bad condition, needing a new roof and some work inside. We hope to be able to get to it sometime this year, as the building is being injured from lack of attention. Several of the small buildings and sheds need new roofs and other repairing.

Agricultural Meetings

The regular monthly Field Day meets were held each month, from March to October. These meetings were, as a rule, well attended and were instructive and beneficial. Some phase of the work on the Station was shown at each meeting and the experiments explained and inspected.

A four days Fair was held during October, a week in advance of the State Fair at Shreveport. The exhibits in the Agricultural Building were the best shown here in years; the farm displays and canned goods department showing up best. The livestock exhibits were discouraging, very few really being worthy of a place at all.

Plans for 1927

The work for 1927 will continue the same lines of work as followed the past year. Some cotton breeding work will be done, in cooperation with Dr. H. B. Brown, cotton specialist of the Experiment Stations.

THREE YEAR COMPOST ROTATION EXPERIMENT, PLOTS A, B & C, EXPERIMENT FIELD.

In this experiment, one-third of the area is planted to cotton, one-third corn and cowpeas and one-third to oats, followed by cowpeas.

During the period between 1889 and 1908 the east half of each plot received an application of compost at the rate of 30 bushels per acre. Since 1908 the compost has been applied to the south half of each plot, therefore one fourth of each plot has received compost annually since 1889, one fourth has received compost annually since 1908, one fourth received it annually until 1908, while one fourth remaining has never had compost at any time. The NE¼ receives application of Acid Phos., at 200 ℔s. per acre.

The compost is made up of green cotton seed, stable manure and acid phosphate.

Results for 1926 are as follows:—

	SE¼	SW¼	NE¼	NW¼
	Fertilized annually with compost since 1889	Fertilized annually with compost since 1908	Fertilized annually with compost until 1908	Has received no fertilizer since beginning of experiment.
PLOT A Corn	12.9 bu. per acre	10.4 bu. per acre	9.9 bu. per acre	6.4 bushels per acre
PLOT B Oats Cowpea hay	1.49 tons per A. .86 tons per acre	1.6 tons per A. .94 tons per acre	1.15 T per A. .78 tons per acre	1.05 tons per A. .64 tons per A. 295 lbs. per acre
PLOT C Cotton	849 lbs. per acre	800 lbs. per acre	622 lbs . per acre	

COTTON VARIETIES, SEASON 1926

	Variety:	Source of Seed:
1	Salsbury	Delta & Pine Land Co., Scott., Miss.
2	D P L No. 4	Delta & Pine Land Co., Scott, Miss.
3	D P L No. 5	Delta & Pine Land Co., Scott, Miss.
4	D P L No. 8	Delta & Pine Land Co., Scott, Miss.
5	New Boykin	Ferguson Seed Farms, Sherman, Texas.
6	Triumph 406	Ferguson Seed Farms, Sherman, Tex.
7	Coker Cleveland, Strain 5,	Coker Pedigreed Seed Co., Hartsville, S. C.
8	Coker Cleveland, Strain 6A	Coker Pedigreed Seed Co. Hartsville, S. C.
9	Coker Cleveland, Strain 6B	Coker Pedigreed Seed Co. Hartsville, S. C.
10	Coker Foster Strain 2	Coker Pedigreed Seed Co., Hartsville, S. C.
11	Lightning Express 6	Coker Pedigreed Seed Co., Hartsville, S. C.
12	Delta Type Webber Str. 5	Coker Pedigreed Seed Co. Hartsville, S. C.
13	Coker "Super-Seven"	Coker Pedigreed Seed Co. Hartsville, S. C.

14 Piedmont Cleveland—Piedmont Pedigreed Seed Co., Commerce, Ga.
15 Cook 588—R. E. Hudson, Auburn, Ala.
16 Cluster Cov.-Toole—W. F. Covington, Headland, Ala.
17 Wannamaker Cleveland — Wannamaker - Cleveland Seed Farm, St. Matthews, S. C.
18 College No. 1—State College of Agriculture, Athens, Ga.
19 Mexican Big Boll—N. C. Expt. Station, Raleigh, N. C.
20 Delfos 1374—Delta Expt. Station, Stoneville, Miss.
21 Delfos 0556—Delta Expt. Station, Stoneville, Miss.
22 Half & Half—Dr. C. C. Craighead, Athens, La.
23 Lone Star 65 A2-A3—Stoneville Pedigreed Seed Co., Stoneville, Miss.
24 Delfos 631 B4— Stoneville Pedigreed Seed Co., Stoneville, Miss.
25 Delfos 6102 A2-C3—Stoneville Pedigreed Seed Co., Stoneville, Miss.
26 Louisiana No. 1, Str. 6—State Expt. Station, Baton Rouge, La.
27 Louisiana No. 1, Str. 18—State Expt. Station, Baton Rouge, La.
28 Louisiana No. 1, Str. 63—State Expt. Station, Baton Rouge, La.
29 Louisiana Hybrid 143—State Expt. Station, Baton Rouge, La.
30 Alexander Wilt Resistant—State Expt. Station, Baton Rouge, La.

All of the above varieties were planted April 29th., following an application of fertilizer, in drill, of Acid Phos. and Nitrate of Soda, three to one by weight, at rate of 400 ℔s. per acre. Was chopped May 22nd., being bunched two to five stalks in hill, ten to twelve inches apart, following which an application of Nitrate of Soda given at rate of 75 pounds per acre, ahead of first sweeping.

It was cultivated about every ten days during the growing period, until the bolls were beginning to open.

Harvested Sept. 10th. and Nov. 18th.

COTTON VARIETY TEST, SEASON 1926

Rank in Value	Variety	Yield Per A.	Lint %	Length of Lint	Value of Lint	Yield, Lint per A.	Value Lint Seed per A.	Character of Lint
1	Salsbury	2574	32.2	1-1/8	14.57	829	$138.23	Good
2	Delfos 0556	2061	32.5	1-3/16	16.82	670	126.60	Good
3	Coker Foster 2 Delfos	1950	33.5	1-3/16	16.82	653	122.79	Good
4	Delfos 1374	1918	30.6	1-3/16f	18.32	587	120.84	Good
5	Coker D. T. Webber 5	1755	30.4	1-1/4	20.32	534	120.71	Good
6	Delfos 6102A2-C3	1924	31.2	1-3/16	16.82	600	114.16	Good
7	Coker Super-Seven	1872	33.1	1-1/8	15.71	620	109.92	Good
8	Coker Cleveland 5	1957	35.3	1-1/16f	14.07	690	109.75	Good
9	Delfos 631 B4	1755	30.2	1-3/16f	18.32	530	109.34	Good
10	D. P. L. 8	1950	36.6	1-1/16	13.57	714	109.24	Good
11	Half & Half	1983	40.6	13/16	12.07	805	108.94	Soft
12	Lightning Express-6	1937	30.9	1-1/8f	15.57	598	106.49	Good
13	Mexican Big Boll	1924	33.2	1-1/8	14.57	639	105.95	Fair
14	Alexander Wilt Res.	2405	29.2	15/16	12.57	702	105.27	Good
15	Coker Cleveland 6B	1658	36.2	1-1/8f	15.57	600	104.	Good
16	Louisiana No. 1- 63	1716	28.9	1-3/16f	18.32	496	103.06	Good
17	D P L No. 4	1814	34.6	1-1/16f	14.07	628	100.21	Good
18	Lone Star 65 A2-A3	1807	32.5	1-1/8	14.57	587	97.72	Good
19	Coker Cleveland 6A	1677	37.4	1-1/16	13.57	623	95.08	Fair
20	Piedmont Cleveland	1944	33.5	15/16	12.57	651	94.76	Good
21	Wannamaker Cleveland	1905	35.8	13/16	12.07	682	94.44	Soft
22	D P L No. 5	1612	31.5	1-1/8f	15.57	508	90.14	Good
23	College No. 1	1723	33.4	1 f	13.32	575	88.07	Soft
24	Louisiana No. 1-18	1690	28.9	1-1/8f	15.57	488	88.00	Good
25	Cook 588	1710	36.4	7/8	12.32	622	87.51	Soft
26	New Boykin	1632	34.9	1 f	13.32	569	86.42	Good
27	Triumph 406	1625	34.9	1	13.32	567	86.12	Soft
28	Louisiana Hyb. 143	1976	28.3	15/16f	12.57	559	84.43	Good
29	Cluster Cov.-Toole	1606	33.5	7/8	12.32	538	76.96	Soft
30	Louisiana No. 1-6	1703	29.8	-15/16	12.57	507	75.68	Good

"Salsbury" and "Alexander Wilt Res." were outside rows, having a decided advantage over the others.

The above prices were based on the New Orleans Market, for Nov. 8th, 1926, Middling Cotton.

COTTON FERTILIZATION EXPERIMENT WITH AND WITHOUT DUSTING FOR WEEVIL CONTROL

Plot 1, Experiment Field.

AREA 1.44 ACRES.

Variety of Seed:—Wannamaker Cleveland Big Boll.

Fertilization Scheme:

Acid Phosphate and Nitrate of Soda, ratio 2 to 1, in amounts of 300, 600 and 900 pounds per acre, on plots as shown below, without Potash. Balance, repeated as above with addition of Muriate of Potash at rate of 25, 50 and 75 pounds per acre. Where amount of Nitrate of Soda is greater than 200 pounds per acre, one-half is applied in furrow, ahead of planting, balance applied ahead of first sweeping after chopping.

Weevil Control:—

By regular dusting, after 10% infestation, applied to central portion of entire area, leaving end fourths as undusted checks.

Check on Fertilization:—

Four outside rows on each side of plot, extending full length of field.

Plots consist of eight in number, of four rows each, thirty six inches apart.

	Per A. Yield	Value per A lint seed	Increase over ck.	Fertilizer cost per A.	Profit per A.
Plat 1. Unfertilized	1606	$79.71			
Plat 2. A. P. 200 ℔ N S 100	1656	82.20	2.49	$4.74	Loss 2.25
Plat 3 A P 400, N S 200	1806	89.68	9.97	9.48	Gain .49
Plat 4. A P 600, N S 300	2131	105.77	26.06	17.16	Gain 8.90
Plat 5. A P 200, N S 100, Mur. Potash 25℔ per A.	1700	84.41	4.70	5.30	Loss .60
Plat 6, A P 400, N S 200 Mur. Potash 50 ℔ per A.	1994	98.97	19.26	10.60	Gain 8.66
Plat 7, A P 600, N S 300, Mur. Potash 75℔ Per A.	2263	112.29	32.58	19.40	Gain 13.18
Plat 8, Unfertilized; Ck.	1606				

Owing to low percentage of infestation, no dusting for weevil was necessary.
Two dustings were given during August for leaf worms, over the entire plot.
Yield on whole plot, 2219,
Yield per acre, 1541 pounds.
(In cooperation with Dr. W. E. Hinds, State Entomologist.)

COTTON FERTILIZATION EXPERIMENT, WITH AND WITHOUT DUSTING, FOR WEEVIL CONTROL.

Plot 2, Experiment Field.

1.44 ACRES

Variety of Seed: Wannamaker Cleveland Big Boll.

Fertilization Scheme:—Comparison of Acid Phosphate alone, at the rate of 200 pounds per acre; Nitrate of Soda alone, at the rate of 200 pounds per acre, and a combination of each, equal parts, at the rate of 400 pounds and 800 pounds per acre; Acid phosphate and Calcium Cyanamid, two to one, at 600 pounds per acre and Armours 15-4.11-5 cotton fertilizer, at the rate of 400 pounds sources of ingredients per acre.

Weevil control:—Same as in Plot 1. The series at each end left undusted, as check; the remainder, or two central series, dusted by regular schedule, after 10% infestation.

Plats consist of six rows each, results being taken from four inside rows, the remaining rows serving as buffers.

	Av. Wt. 4 Rows	Rate Yield Per Acre
No. 1 Check. Unfertilized,	51.06	1532 ℔s.
No. 2 Acid Phos. 200 ℔s. per acre	54.19	1626 ℔s.
No. 3 Nitrate of Soda, 200 ℔s. per acre	64.50	1935 ℔s.
No. 4 A. P. & N. S., equal pts. 400 ℔s. per A.	65.00	1950 ℔s.
No. 5 A. P. & N. S., equal pts. 800 ℔s. per A.	66.50	1995 ℔s.
No. 6 A. P. 400; Cyanamid 200 ℔s. per acre	60.44	1813 ℔s.
No. 7 Armour's "15-4.11-5," 400 ℔s. per acre,	61.94	1858 ℔s.

Owing to low percentage of infestation, no dusting for weevils was necessary. Two dustings for leaf worms were given, over the entire plot, during August.

KUDZU PLOT,
CORN AND COTTON
TEST.
AREA .46 ACRE EACH

This area is very sandy, poor, unprofitable to cultivate, planted in Kudzu and allowed to go without cultivation until Kudzu thoroughly covered the surface, or about three years growth.

These plots were flat broken with tractor and disc break plow during February 1926, turning under heavy growth of dead Kudzu vines, stems and leaves.

CORN

Planted in water furrow, following application of Acid Phosphate, at rate of 250 pounds per acre, in drill. No other fertilizing material was used. Immediately after last cultivation, Kudzu and grass covered the entire plot, reducing the yield considerably.

Harvested Nov. 11., 13.64 bushels per acre.

COTTON

Planted on 3½ ft. rows, April 27th., following an application of Acid Phosphate in drill, at rate of 400 pounds per acre.

Barred off and chopped, May 19th., leaving 2 to 5 plants per hill, 10 to 12 inches apart. Given usual cultivation during growing season. Picked Sept. 30th. & Nov. 15th., yielding at rate of 2045 pounds per acre.

CORN VARIETY TEST RESULTS, PLOT 7

EXPERIMENT FIELD

	NAME	SOURCE OF SEED	Yield Bu. Per Acre
No. 1	SURCROPPER—	Ferguson Seed Farm, Sherman, Texas	31.74
No. 2	Yellow Dent—	Ferguson Seed Farm, Sherman, Texas	30.00
No. 3	Chisholm—	Ferguson Seed Farm, Sherman, Texas	34.74
No. 4	Calhoun Red Cob—	I. L. Haile, Linville, La.	32.25
No. 5	Big Ear Prolific—	Dr. L. C. Allen, Hoschton, Ga.	37.24
No. 6	Paymaster—	W. H. Neal, Lebanon, Tenn.	34.00
No. 7	Rogers—	D. H. Wallace, Verda, La.	32.60
No. 8	Whatley Prolific—	Whatley Bros., Helena, Ga.	40.25
No. 9	Sentell White Dent—	J. M. Sentell, Dixie, La.	38.00
No. 10	White Calhoun—	State Expt. Station, Baton Rouge, La.	34.00
No. 11	Yellow Calhoun,	State Expt. Station, Baton Rouge, La.,	Failed to germinate
No. 12	Calhoun Red Cob—	State Expt. Station, Baton Rouge, La.	31.24
No. 13	Yellow Creole—	State Expt. Station, Baton Rouge, La.	37.03
No. 14	White Creole—	State Expt. Station, Baton Rouge, La.	44.6
No. 15	Calhoun Red Cob—	N. La. Expt. Station, Calhoun, La.	30.00
No. 16	Calhoun Red Cob—	W. S. Powell, Stonewall, La.	31.24
No. 17	Hastings Prolific—	H. G. Hastings, Co., Atlanta, Ga.	44.25
No. 18	Sargrain (Sorgum)—	Delta Expt. Station, Stoneville, Miss.	52.43

All of the above varieties were planted April 15th, in four foot rows, following an application of Acid phosphate and Nitrate of Soda in drill, 4 to 1 by weight, at rate of 300 pounds per acre.

May 6th. Thinned. Side harrowed.

May 17th. Dirted up with two 3 inch scooters and two 6 inch shovels on Cultivator.

June 3rd. Applied Nitrate of Soda, by hand, at rate of 75 ℔s. per acre, followed by cultivator with four sweeps.

June 25th. Ran "Fowler" cultivator in middles, followed by pea planter.

DEMONSTRATION 3 YEAR ROTATION,

AREA NO. 1

OBJECT:—Comparison of yield, per acre, following three year rotation of corn and velvet beans, corn and cowpeas or soy beans, and cotton the third year, and an actual record of cost per acre of producing the crop.

COST:—Here means expenditures on labor, seed. fertilizer, etc., and does not consider interest on investment, depreciation of implements, etc.

Previous Crop:—Corn and Velvet Beans.
Present Crop:—Corn and Soy Beans.
(Acreage, 17 acres.)

Cost of Producing Crop:—

Preparation of soil and planting	$87.33
Cultivation,	91.50
Fertilizer, 3500 ℔s. A. P.; 850 ℔ Nitrate of Soda,	54.29
Seed, corn and beans,	31.00
Harvesting,	25.39
Total Cost,	$289.51
Total Cost per acre	$ 17.03

Total yield, 20912 ℔s. corn;
Yield, per acre, 17.57 Bu.
Estimated yield beans, 11.00 Bu. per acre

Total yield, corn and beans, per acre,	$50.57
Cost of production, per acre,	17.03
Excess receipts per acre	$33.54

Beans estimated at $3.00 per bushel. Lower estimate will be necessary when there is no sale for seed purposes.

AREA NO. 2

(Acreage 13 Acres.)

Previous Crop:—Cotton.
Present Crop:—Corn and Velvet Beans.

Cost of producing crop:—

Preparation of soil and Planting,	$64.89
Cultivation,	59.63
Fertilizer, 2800 ℔s. A. P., 700 ℔s. Nitrate of Soda,	44.10
Seed, Corn and Beans,	19.50
Harvesting,	21.75
Total cost,	$209.87

Harvested 19790 ℔s. corn; yield 21.7 bu. per A.
Estimated yield beans, 6.00 bu. per A.

Value 21.7 bu. corn, 6.00 bu. beans,	33.70
Cost of production,	16.14
Excess of receipts per acre,	$17.56

Beans estimated at $2.00 per bushel.

DEMONSTRATION 3 YEAR ROTATION
(Continued)

AREA NO. 3 (11 ACRES) "OLD PEACH ORCHARD"

Previous Crop: Corn & Peas.
Present Crop: Cotton.

Preparation of soil and planting	$ 76.48
Cultivation, chopping and hoeing,	108.89
Fertilizer,	88.15
Seed,	5.50
Poison and labor for worms,	23.00
Harvesting, 17735 ℔s. @ $1.30	230.55
Ginning, bagging and ties,	84.74
Total cost of production	$617.31
Total cost per acre	56.12

6030 ℔s. lint (34% 17734 ℔s.) @ .15c	$904.50
11705 ℔s. seed, @ $20.00 per ton,	117.05
Total receipts,	$1021.55

Less cost of production,	617.31
Excess receipts per acre	404.24
Excess receipts per acre,	36.75

"SOUTH LEE FIELD"

(Area 3, Continued. 8 Acres)

Previous Crop:—Corn and soy beans.

Present Crop:—Cotton.

Preparation of soil and planting,	$49.95
Cultivation,	53.38
Fertilizer,	72.40
Seed,	4.00
Poison and labor, for worms,	8.40
Harvesting 10760 ℔s. @ $1.30,	139.88
Ginning, bagging and ties,	51.44
Total cost of production,	379.45
Total cost per acre,	47.43

3165 pounds of lint, @ .15c,	$474.75
7595 pounds seed, @ $20.00,	75.95
Total receipts,	$550.70
Less cost	379.45
Excess receipts	171.25
Excess receipts per acre	21.41

SOY BEANS
SELECTIONS FROM ORIGINAL BILOXI

Planted June 26th., following oats.

Fertilizer, one application of Acid Phosphate, at rate of 200 ℔s. per acre, in drill immediately ahead of planting. Harvested Nov. 4th.

YIELD PER ACRE

No.	Av. Ht.	Hay, lbs.	Seed, Bu.
6	48 inches	3000	5.83
43	50 inches	2400	7.00
44	39 inches	1866	2.91
45	48 inches	3000	5.25
53	48 inches	2800	6.42
57	42 inches	2460	5.83
58	48 inches	3240	7.00
60	42 inches	2580	7.00
61	54 inches	4420	7.58
64	36 inches	1872	8.75
86	36 inches	1760	4.66
108	34 inches	1640	9.01

FORAGE CROPS

Variety	Yield per acre Hay, lbs.	Grain, Bu.
Shallu (Egyptian Wheat)	3820	51.34
Sagrain	3245	48.14
Feterita	3565	16.40
Kaffir Corn	4320	23.72
Sudan Grass (2 cuttings)	4460	4.50
Mung bean	1880	6.23
Clay Cowpea		5.84
Iron		5.84
Whippoorwill		9.74
Brabham		8.92

All of the above varieties were planted in field opposite Agricultural Building, June 28th., and given clean cultivation until mature.

WEATHER REPORT
NORTH LA. EXPERIMENT STATION, IN COOPERATION WITH U. S. DEPARTMENT OF AGRICULTURE,
WEATHER BUREAU

MONTH	Max. Temp.	Min. Temp.	Clear Days.	Cloudy Days.	P. Cloudy Days.	Days Rain.	Rainfall, Inches.
January	69	24	10	15	6	7	3.53
February	79	25	17	7	4	4	.57
March	80	29	9	16	6	12	6.81
April	87	31	14	8	8	8	2.00
May	94	46	13	2	16	9	3.83
June	97	51	12	5	13	4	1.62
July	100	56	9	9	13	12	6.43
August	99	63	9	10	12	10	6.44
September	95	61	14	4	12	6	1.00
October	93	34	13	8	10	7	3.05
November	74	23	11	9	10	9	3.06
December	74	17	8	16	7	13	11.41
MEAN	86.75	33.83					
		Total	139	109	117	101	49.75

STATE FUND
RICE EXPERIMENT STATION.
Crowley, Louisiana.

J. MITCHELL JENKINS, Superintendent of the Station and Associate Agronomist, Office of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture.

Meterological Observations.

Weather conditions were nearer normal in 1926 than during the years 1924 and 1925. The precipitation for January and March was the heaviest ever recorded at this station for these months. During June, July, August, and September, the precipitation was much below the average for the same period during the past 16 years.

The total precipitation for the year was 63.68 inches, which is 8.40 inches greater than the average for the 16 years previous, and 13.71 inches more than that recorded for the year 1925. Only four times since 1910 has the annual precipitation been greater than it was this year.

The average mean temperature for the first five months was 61°F or 9°F less than for the same period last year; while the average mean temperature for the remaining months was practically the same for the two years. The monthly average mean temperature for the year was 4°F less than in 1925.

The lowest temperature during the year was 29°F, recorded January 13, and 14, and December 16. The temperature went to freezing or below eight times during January; once during February; once during November, and twice during December, making a total of 13 times for the year, against 12 times during the year 1925.

The highest temperature for the year was 99°F, recorded July 3.

THE EFFECT OF THE WEATHER ON THE RICE CROP OF SOUTHWESTERN LOUISIANA

Due to the extremely dry weather that obtained during the previous two years, and its effect upon the supply of irrigation water, most rice farmers did everything possible to seed their crop early thinking that the rains of early spring might not continue and would result in a shortage of water later; and that with early rice they would have a chance of making a crop with the water remaining in the streams and lakes. This desire to seed early led many to adopt the system of broadcasting upon a wet seedbed, and covering with a harrow. This system of "mudding-in" a crop is usually resorted to during seasons of frequent rains as a last means of seeding in late spring. It sometimes proves satisfactory, but frequently results in a poor stand. Frequent rains during March and April did not allow the wet soil to bake over the seed and for this reason many of the fields that were "mudded-in", this year, had fair stands of rice, and at first the indications were that they would produce heavy yields. Towards maturity it was found that many fields were badly infested with weeds, and as a result the yield from early rice was in general disappointing. However, the acreage seeded to early maturing varieties was quite large. This placed on the early market too much of this type of rice, resulting in low prices from the very beginning of the harvest season.

In the end it was realized that all of the anxiety for fear there would be no water in the streams for irrigation purposes, was unnecessary. At no time during the season did the salt content of the water, of the streams and near-by lakes, go above about 19 grains of salt per gallon, and this was as late as August 19.

Excellent weather obtained during the harvest season, permitting cutting and threshing to continue with few interruptions until the entire crop was in the sack.

The Relation of the Consumption of Rice to Field Yields, and to Types or Varieties.

During the fall and winter there was much dissatisfaction and anxiety due to the price of rough rice. The farmer was not offered enough to pay for the expense of growing the crop. The demand for milled rice, of course, has much to do with the price offered for the rough; and on the other hand the price of the milled rice and the type of rice offered has much to do with the demand for the milled product. This is indicated by the fact that frequently certain types at a higher price are more readily taken by the consumer than other types at a much lower price.

This is not the first year that this condition relative to prices has occurred. It has been true frequently in the past, and has caused constant unrest throughout the industry on account of fear of over production, and low prices.

The situation could no doubt be greatly improved in future years by producing larger yields per acre, of types known to be preferred by the consumer. Frequently, the acre yields are so low as to necessitate a price out of all reason in order that the farmer realize a profit on his investment. When the yields are low and the type or variety of rice grown is not at all popular, both of which were true in many instances this year, disappointment, and dissatisfaction are bound to result.

If the average yield of rice in southwestern Louisiana were doubled, and this can be easily done by employing the most improved methods of culture, the farmer could sell at a reasonable price and at the same time realize a profit, thus aiding in one way towards increasing the demand for rice.

The failure of the consumption of rice to increase in the United States is due in large measure to the fact that the greater portion of the crop now grown consists of varieties of rice of a type not wanted by the consumer. Many of the old rice consumers are being gradually weaned from eating rice, and few new converts are made because of the unattractive culinary properties possessed by the bulk of our commercial rices.

To relieve the present situation the industry must realize that rice is not a very popular article of food in the United States, also that the life and growth of the industry depends on increased consumption. Therefore, every effort should be made by every one interested in rice culture in all its phases to ascertain just what the consumer wants, how he wants it, and why he wants it, and then use every effort possible to meet his requirements.

Much is being said at present about price fixing and exporting. Price fixing does not seem to meet with the approval of those competent to judge as to its merits. From all indications, foreigners do not like certain types of rice we produce, nor the prices, any better than our own people. In fact, with few exceptions, the same general type of rice is preferred the world over; that is a type the grains of which when cooked, retain their general shape, stand apart, are not gluey, and are of tender texture. In addition to these qualities, the most popular rices possess distinct and palatable flavors. Therefore, that which is done to increase the consumption of rice at home, will at the same time increase the demand abroad.

Sugar Cane Beetle Injurious to Rice

During the fall many inquiries were received from farmers and canal owners in the Parish of Jefferson Davis, with reference to damage to rice caused by the sugar cane beetle. This insect was reported last fall in the northwestern portion of the parish. This fall it was reported in large numbers, from points as far east as, and farther south than, the town of Roanoke.

Very often this insect causes some damage to young rice in the spring, but is easily controlled by applying irrigation water. At this season its presence is noted generally throughout the rice growing region of the state. Last fall was the first time it was reported as attacking rice in the autumn. As soon as the fields were drained preparatory to harvest, the beetles appeared in large numbers, feding on the rice culms at or just under the surface of the soil. It was estimated in some localities that 50 to 75% of the culms were chewed off. If the stems were cut off before the plants had matured the quality of grain was lowered. In the case of mature plants, loss was sustained due to lodging.

The only means of control found, so far, is to hold the irrigation water until the plants are mature, and begin harvest immediately after the water has been removed.

This makes harvesting very unsatisfactory, and is apt to result in loss due to the wet condtion of the field.

The representative of the Bureau of Entomology, located at this station, devoting his time to Rice Insects, is doing all that he can do to determine some means of control.

Station Results

The same lines of investigation were pursued, as reported for the past years. A slight change was made in the rotation experiments, by extending them to include cotton. This addition was made for the purpose of determining the advisability of growing cotton in rotation with rice. This work will be conducted over a long period of years.

Artificial manure was added to the group of fertilizer experiments. This manure is made by composting rice straw, sulphate of ammonia and raw lime rock. If found satisfactory it will form a means of more profitably utilizing the large quantities of straw produced each year.

The yields on the entire station were less than of last year. This seemed true of commerical fields in this vicinity. There seems to be no special reason for this, unless the somewhat low mean temperature was in some way responsible.

Certain varieties of rice, in increase plats, which gave excellent yields last year, produced, under practically the same conditions this year, results that are very unsatisfactory. This was especially true of some early maturing varieties. This is discouraging because of the scarcity of strictly good early maturing rices.

In the date of seeding experiment, weather conditions prevented seeding as planned. In place of six seedings only four could be made. The highest yields were secured from seedings made May 18, 29 and June 15.

The results in the rate of seeding experiment indicate that little if any thing is to be gained by drilling more than

60 to 80 pounds of seed per acre; and that in broadcasting seed the highest yields may be expected from the heavier applications.

In the experiment in the manner of seeding, the yields from drilling were much heavier than where the seed was sown broadcast. An unusually wide range in results between the two methods was likely due largely to unfavorable conditions for germination.

Results in the rotation experiments show clearly the advantage of crop rotation over the continuous planting of one crop. The yields from plats that have been under rotation for several years are 5 to 7 times greater than from plats in which rice has been grown each year during the same period.

Results secured from commercial fertilizers agree rather closely with those secured in former years, and further prove the inadvisability of attempting to use such fertilizers to increase revenues in the growing of rice on Crowley Silt Loam.

Extension of Station Results

Information regarding results secured on the station is reaching a large number of people each year, as is indicated by the number and character of inquiries received. That this information is being used is indicated by the fact that many farmers are putting it to the test: by discontinuing the use of commerical fertilizers on rice; by the use of soybeans in rotation with rice; and by the purchasing of seed rice from the station. Much of the interest shown in the work of the station has been brought about by the Extension Division of the Louisiana State University. It is much regretted that it was found necessary to sever the direct contact between the station and the Extension Division of the University, by discontinuing, last fall, the position of rice specialist; and it is sincerely hoped that it will be found possible to re-establish this connection in the near future.

Entomological Work

The representative of the Bureau of Entomology of the United States Department of Agriculture, located at this station, continued his investigations, pertaining to rice, sugar cane, and soybean insects. He was able to confirm some control methods developed the year previous.

Equipment

The station equipment was strengthened during the year by the purchase by the State Experiment Station, of a mule to replace one that is unfit for work.

Living accommodations in the station residence were increased, by the remodeling of the second floor, to provide a hall, three bed-rooms, and a bath-room.

One of the outstanding improvements of the year was the graveling of the roadways on the station grounds. This was made possible by a donation of gravel from the Police Jury of Acadia Parish. This improvement adds greatly to the convenience of the employees, and to the attractiveness of the premises.

FRUIT AND TRUCK STATION,
Hammond, La.

B. Szymoniak, Horticulturist in Charge

Fertilizer Test for Strawberries

The plan of fertilizer applications previously reported, was interrupted by the use of commercial fertilizer of unknown sources of nitrogen, phosphorous and potash. The plan will be reinstated next year on the next plat to receive strawberries in the rotation.

Strawberry Variety Test

The ten varieties grown for the past three years have died out due to adverse seasonal conditions. The following varieties were grown, Missionary, Gandy, Aroma, Lady Cornelie, Evening Star, Premier, Texas, Nick Ohmer,. and Excelsior. These were compared with the Klondike. Five hundered plants of each variety were grown side by side on about the same type of soil with all conditions as culture and fertilizers the same. The Klondike plants grew through the hot dry summer and produced plants. The Missionary variety produced only a few plants. The other varieties with cultivation and mulching seemed to have dried up. We have therefore discontinued all these varieties; except the Klondike.

The following varieties were received for testing Nov. 10, 1926 from the Bureau of Plant Industry, Washington, D. C.

223H25-Klondike, 238H25-Klondike, 261H25-Klondike, 658 Missionary-Howard 17, 778 Missionary-Howard 17, 777 Missionary-Howard 17, 656 Missionary-Howard 17, 177 Burrill-Klondike, 713 Mixed Crosses, 108H25-Klondike, 655 Missionary-H25, 255 Missionary-H17, 723 Mixed Crosses, 540 Mixed Crosses, 778 Missionary-H17, 712 Mixed Crosses, 612 Mixed Crosses, 615 Mixed Crosses, 611 Mixed Crosses, 720 Mixed Crosses, Ettersburg 80-Americus, 542 Mixed Crosses, 612 Mixed Crosses, 540 Mixed Crosses, 147AH25-Klondike, 632 Portia-Eurerko, 659 Missionary-H17, 657 Missionary-H17, 612 Mixed Crosses, 714 Mixed Crosses, 716 Mixed Crosses, 223H22-Klondike, 719 Mixed Crosses, 611 Mixed Crosses. Total 3,020 plants.

Muscadine Grape Culture

To determine the practicability of commercializing the growing of muscadine grapes.

This is the fourth season of growth. The Thomas variety interplanted with one male vine to ten producing vines is the one used for the grape juice production a wondeful crop set on the vines and the fruit began to ripen about the 15th of August. On the 25th of August we were visited by a Tropical Storm which shook a great amount of the fruit off the vines.

The thousand vines produced 1540 pounds of grapes.

These were made into unfermented grape juice—amounting to 51 gallons.

The Thomas variety makes a straw colored grape juice of excellent quality.

The formula as developed by the U. S. Dept. of Agriulture was followed in the making of the juice. The vines are vigorous and healthy and the only attention given them was an application of 200 pounds of Nitrate of Soda and 400 pounds of Acid Phosphate per acre. The Kinffin system of pruning is practiced and cultivation in the form of plowing the vineyard is given in the Spring.

This project seems to point to a wonderful future for muscadines.

Blackberry Culture

Supplementary money crop to the strawberry crop.

The MacDonald Blackberry variety is interplanted with Lucretia Dewberry for pollination of the blackberry.

Twenty-eight Crates of 24 pints each were harvested. The fruit was of fine quality large size and the vines healthy and vigorous.

We had the same trouble experienced last season in gathering and marketing the crop.

Lack of labor is acute at the time of the ripening of the fruit which occurs at a time when the last crop of strawberries is being picked. There was no demand for the blackberries locally or for shipping. The variety has proven very satisfactory from the production and shipping quality standpoint. They ripen a month earlier than the wild blackberries and are better adapted to shipping. If grown as a community proposition when they could be shipped in carload lots they would prove no doubt a remunerative crop.

Rotations

This project has for its aim the development of the best system of rotations adapted to the strawberry section, with the idea of increasing humus and soil fertility in the most economical manner.

The following crop rotation was followed during the past season, Corn and soybeans, followed by Biloxi soybeans after which the strawberry crop is produced.

This rotation is proving very satisfactory from the standpoint of soil tilth condition. But now since a Skinner irrigation system was installed on the land where the strawberry crop is being produced it would seem that other more intensive crops should be grown. We have not yet determined which crops would suit the conditions best.

Satsuma Orange Culture

To grow satsuma oranges in order to determine the commercial possibilities in regard to time of bearing, yields, money return from each year's crop.

The dry season of 1925 was already reported on. During 1926 in February 100 more Satsuma were set out. These were fertilized with Barnyard manure in March and the land cultivated during the summer by discing and harrowing. The trees are looking fine and have made a satisfactory growth. No yield of fruit can be reported on.

Pecans, Pruned vs Unpruned Trees

To determine the relation of pruning to yield of pecans with special reference to increasing time at which the trees will come into bearing.

The trees have not made a sufficient growth during 1925 for pruning. One Schley tree set a light crop of pecans after four seasons of growth. The tropical storm of August 25, 1926 has blown all but one pecan which matured into a beautiful specimen.

The trees made a sufficient growth during the past season for pruning this winter.

Stocks for Pecan Grafting

To determine the best root system on which to graft pecan trees of named varieties.

This project is followed in cooperation with U. S. Dept. of Agr., The trees have not made sufficient growth for results. This observation may prove of value, that in grading the seed pecans into large, medium and small sizes the small though perfect seed produced trees just as large and just as vigorous as the finest large seed.

HATCH FUND

The Hatch fund of fifteen thousand dollars, is a Federal appropriation. The Hatch Act of 1887 was the Act that originally provided for the establishment of agricultural experiment Stations. A large part of this fund at this time is being spent on sugar cane, soy beans, and corn, in field experiments, and on a new project on farm mechanics.

This project is treated in a brief report to follow.

Farm Mechanics Department

C. L. Osterberger, Specialist

Last August we began experimental work in Farm Mechanics and undertook two major projects: (1) The Artificial Curing of Hay; and (2) A Study of the Deficiencies in Agricultural Implements Applied to Cane Culture.

In addition to these two projects we are charged with the proper care, repair, and operation of the Station's implements and Machinery, the making of such changes and adjustments as are necessary, together with all general farm mechanics problems that arise on the Station farms.

This being a new and broad field, considerable preliminary work necessarily had to be done and frequent and

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varied demands have been made by several other departments for our time and assistance, which we have always tried to care for.

We have gathered a quantity of data on the artificial curing of hay and now have very definite ideas as what is desired and will have an experimental drying outfit in operation this season. Professor J. J. Munson, of the Sugar Engineering Department, is cooperating in this work, with the hope of finding a means of economically using the present sugar house facilities and equipment in curing hay artificially.

On our other project—A Study of the Deficiencies in Agricultural Implements Applied to Cane Culture—we have also gathered some data and have experimented with several types of tractor plows for fall breaking. We have at this time an experimental mold board plow for completely breaking a cane row in one operation, which, while not perfected, has possibilities.

This study will be continued throughout the cane-growing season, with the hope that we can find methods and implements which will help decrease the cost of cane production. Some attention has been given sugar beet culture. A roller has been designed and built for planting beets, and plans are being worked out for preparing, planting and cultivating two rows at a time, which will materially decrease labor costs. Further studies on both these projects are to be made.

Department of Agronomy

A. F. Kidder, Agronomist.

H. F. Stoneberg, (Detailed by Offiice of Cereal Investigations, Bureau of Plant Industry, U. S. Dept. Agriculture.)

Professor Kidder resigned in June to accept a position in plant breeding work in Lima, Peru, S. A. The grains under his care have been preserved by the Department of

Agronomy of the University, for perpetuation. The cotton work has been assigned to Mr. H. B. Brown, and is reported under another heading in this publication.

Mr. Stoneberg's work in corn breeding goes on without interruption or modification.

The soy bean selections are cared for, temporarily, by a student assistant.

The beet sugar work has been enlarged and D. N. Barrow has been giving all of his time to this work since July 1, 1926; his report appears elsewhere.

CORN INVESTIGATIONS

Hugo Stoneberg, Assistant Agronomist,
Office of Cereal Crops and Diseases,
U. S. Department of Agriculture.

Investigations and experiments on the production and improvement of corn in cooperation with the Office of Cereal Crops and Diseases, United States Department of Agriculture, were continued along similar lines as in the preceding three years. About 4,000 self-pollinations and about 1500 cross-pollinations were made in connection with the breeding program.

Self and cross-pollinations were made in the seventh and eighth generations of selfed lines of several varieties to maintain the selfed lines and to determine the relative value of these lines in crosses. Some 116 crosses between selfed lines selected especially for husk protection against insect damage were grown in comparison with Yellow Creole, the most common variety in the sugar cane region. Some of the crosses yielded less, some more, and the majority yielded approximately the same as Yellow Creole. A few of the crosses, however, produced large yields of ears with husk which showed excellent resistance to ear-worm and weevil attack.

Self and cross-pollinations were made in the F2 of a cross between two previously selected selfed lines to determine whether better selfed lines and crosses can be obtained from the second cycle of selection than from the parent selfed lines.

Some 13 varieties were grown in comparison to determine their productivity. Cocke Prolific and Mosby Prolific were the higher yielders.

Data were obtained on the productiveness of several varieties influenced by the infection with the mosaic disease. The data for 1925 and 1926 have been submitted for publication as a Department Bulletin.

SUGAR EXPERIMENT STATION

W. G. Taggart, Assistant Director.
D. J. De Arensbourg, Field Overseer.

The field work of this station as organized, and reported on in the 1925 report, has been continued without change. More land has been opened up and made ready for experimental work, and still more land is being drained and put into a state of cultivation. The equipment for farm work was increased by the purchase of a tractor and three mules with necessary implements.

Rotation and Fertilizer Experiments

One hundred and fifty experiments embodied within a three-year rotation of two years of cane and one year of other crops were grown, harvested and the data therefrom placed on record. One hundred and twenty experiments embodied within a four-year rotation plan of two years of cane and two years of other crops, was likewise grown, harvested and the data recorded.

These experiments, while in progress only three years, have begun to attract a great deal of attention from the many planters who visit the fields of the Experiment Station, some of them making many visits to the station fields for the purpose of watching and discussing the progress of the crops as they grew. Data on hand already begins to show the value of wider rotation, the turning under of more legumes and good soil treatment.

In all of the general plantings of sugar cane in fertilizer tests and rotations, selected seed, secured in an inexpensive way such as could be used by all sugar planters of the state, was planted. The evenness of growth, uniformity of stand, and unusual good yields, of the old varieties selected, point clearly to the wisdom of our practice and the advantages to be derived by those who choose to follow the example. In spite of the damage done by the tropical storm, D-74 gave as much as 22 tons from first year stubble, and 27 tons from plant. Louisiana Purple, from selected seed which was not broken by the storm, gave as high as 27 tons from stubble and over 30 tons from plant.

Seedling Canes

As in previous years we have cooperated with the Office of Sugar-Plant Investigations in securing and testing new varieties of sugar cane. Due to the freeze at Canal Point, Florida, in the winter of 1925-26, and the storm of 1926, we did not secure any new seedlings this year. Some new Canal Point seedling that had been started before the freeze, were brought forward and planted at the station. Two P. O. J. canes and one other variety, B. H. 10/12, were secured from Washington. B. H. 10/12 grew well in spite of a heavy infection of mosaic, contracted after germination here. It is worthy of note that some of the U. S. and Canal Point seedlings in addition to being immune or strongly tolerant to disease, show great resistance to cold weather. This year, with its early bud-killing frost, was not favorable to variety tests in that maturity was stopped at the time of the frost. We are strongly of the opinion that some of these vigorous canes that showed only a fair degree of maturity in comparison with the standard varieties, will show ability of greater maturity when given a little longer growing period.

Very satisfactory tonnage was secured from some of the P. O. J. canes. P. O. J. 234 that produced only 16 tons as plant cane in 1925, produced 24 tons as stubble in 1926. P. O. J. 213, where there was a thin stand due to transplanting, gave 30 tons from first year stubble and 33 tons as plant cane. P. O. J. 36 gave 32.5 tons from plant. P. O. J. 228 gave over 35 tons from plant cane. In maturity P. O. J. 234 stands ahead, 213 is second, and 36 with 228 rank third. P. O. J. 826 made a very good growth and a yield of more than 30 tons from plant cane, but did not show up so well on stubble.

All of the P. O. J. cane grown from those varieties which have been released were used either for planting at the station or for planting out in the state. P. O. J. 234 was sold to planters at a nominal price, and 36 with 213 was put out under contract with planters who agree to sell eighty per cent of what they grow to planters in their community at not more than ten dollars per ton.

Some considerable seed of P. O. J. 228, 979, 2379, as well as selected seed of D-74 and Louisiana Purple, were furnished the U. S. station at Houma for experimental purposes, and this station received in return some P. O. J. 234, 36, 213 and 826 for planting in the western part of the state.

A bulletin is now in preparation on seedling canes.

Other Crops

Six and six-tenths acres of alfalfa produced enough hay to feed 16 head of livestock for the year.

A considerable acreage was devoted to testing varieties of soy beans which have been developed at the station. We now have a number of varieties with habits which make them more desirable than the old standard varieties.

ADAMS FUND

Fifteen thousand dollars is appropriated annually to each state by the Federal Government, under the Adams Act, for enlarging the work of the Experiment Stations. Under the provisions of this Act only work of a technical nature is permitted. The greater portion of the work is in the nature of laboratory research, looking to an enlargement of our knowledge of scientific facts and principles.

In Plant Pathology, the Purnell fund and Special Sugar Cane fund supplement the Adams fund.

Department of Bacteriology

W. L. Owen, Research Bacteriologist

The work of this department for the past year has been principally devoted to the two main projects which were begun about one year ago, and which were outlined in the report for 1925. These projects are (1) A study of the effect of buried cane trash upon soil nitrates, (2). The production of alcohol from bagasse.

The Effect of Buried Cane Trash Upon Soil Nitrate

The results of a large number of laboratory experiments on the effects of cane trash upon soil nitrates may be summarized as follows:

The addition of undecomposed trash to the soil results in a rapid loss of nitrates. This depressing action of the cane trash upon nitrate is quickly lost, however, after the trash has partly decomposed. This decreasing depressing effect of partially decomposed trash is very clearly reflected in the results of experiments where fresh trash is compared with trash that has been buried from one to six weeks. The results of these experiments show a gradual diminution of the loss of soil nitrate in direct ratio to the length of time that the trash has been allowed to decompose. The practical bearing of these experiments on cane culture is precisely this: that if the interval between the burial of the trash and the application of nitrate fertilizers be sufficient for decomposition, the incorporation of the trash will doubtless be beneficial to soil nitrates. Otherwise if it has not sufficiently decomposed, the depressing effect of the trash will no doubt be reflected in the transformation of the available nitrate into a less available form. In view of the fact that the trash from one ton of cane contains as much nitrogen as 27 pounds of cottonseed meal, the ability to add this much nitrogen to our soils without disturbing the equilibrium of our added nitrate nitrogen, becomes a matter of prime importance.

The addition of fresh trash to soil is also reflected in a change in the microflora. The most noted effect of the added trash being a marked increase in the number of soil fungi, and a higher ratio between their numbers and the total number of micro-organisms present. An effort to correlate this depressing effect of trash upon soil nitrates and the comparatively inert condition of partially decomposed trash with the starch and pentose content of the material, has given results which indicate that it is the elimination of these substances which removes the harmful effects of trash upon soil nitrates. It is quite likely that a determination of the starch and pentoses of trash may be used as a criterion of their effect upon soil nitrates, and hence its suitableness for incorporation in the soil simultaneously with nitrate of soda may be ascertained.

The data of laboratory experiments are to be applied in field experiments on the Experiment Station plats where cane trash is turned under, and the effect of adding this material to the soil will be studied in its relation to the nitrate content of the soil, as well as upon crop yield. Pot experiments are also contemplated, to further determine the effect of trash upon soil nitrates and plant growth.

ADCO EXPERIMENTS

The test of ADCO upon rice straw for the production of artificial barnyard manure, which was begun in the fall of 1925, was completed in the early summer of the past year. The material decomposed satisfactorily and its physical condition, as well as its chemical composition, indicated a suitable substitute for barnyard manure. Field tests of this material are to be made to determine its manurial value for farm crops.

Investigation of the Possible Utilization of Bagasse for Power Alcohol

The status of bagasse in the sugar industry of this state has undergone a radical change within the past few years. Formerly regarded as a supplementary fuel for sugar factories, its utilization for fiber board has met with such conspicuous success that it seems not unlikely that this use for it may eventually consume the entire production from our cane crop. As a fuel the residual sugars of bagasse have a calorific value that contributes something to its use for that purpose; but these are detrimental to its keeping quality and have to be eliminated before the bagasse is used for fiber board. In view of the fact that these sugars give to bagasse a potential alcohol yield of from five to seven gallons of alcohol per ton, and their removal by fermentation, would tend to make the bagasse less susceptible to deterioration, it would seem very desirable to determine if the sugar content of bagasse can be efficiently converted into alcohol. This investigation was begun a year ago on baled bagasse from Glenwild factory, furnished us by the Celotex Company. The results of these experiments showed that the addition of unsterilized bagasse to fermenting molasses solutions tended to depress the yield of alcohol from the sugars present. Sterilized bagasse if used in proportions not in excess of 1 part by weight of bagasse to 1.5 of molasses, resulted in an overall or total efficiency of 90% of the theoretical. While it was found that the fermented bagasse was still susceptible to deterioration from mold fungi, when in its moist condition, by treating it with suitable preservatives this could readily be prevented. The use of baled dry bagasse for alcohol manufacture was found to have several disadvantages; so during the grinding season the work was continued on fresh bagasse from the Station sugarhouse. The results on fresh bagasse have in almost every case given an increased yield of alcohol over the molasses solution containing no bagasse. In all cases this has indicated a satisfactory overall efficiency of fermentation. The ratio of bagasse to molasses, and the density of the molasses solution which is best adapted to the maximum utilization of the sugars in the bagasse, have received a great deal of attention in these studies. Special devices have been used for percolating the fermenting solution over the bagasse, and comparisons in efficiency between extraction with water and molasses water solutions have been noted. The results of the investigation of the fermentation of baled bagasse were published in the International Sugar Journal, 28. 463-70, 1926. This work will be continued until our present supply of fresh bagasse is exhausted.

Miscellaneous

In order to determine the distribution of micro-organisms in Cuban raw sugars from the crop of 1925, samples received through the courtesy of the American Sugar Refinery Company from their Chalmette plant at New Orleans, were tested. These 60 samples, representing approximately every cargo received at the Chalmette slips, were studied with the view of correlating the changes in composition of these samples in storage, with their respective microflora.

Calls Upon The Department for Consultation

Frequent litigation between buyers and sellers of sugars over deterioration of the product in storage, or in transit, results in occasional requests to the Station to contribute the benefits of its experience in deciding these disputes. As a result of the fact that it was a pioneer in instituting these investigations, these calls may be considered a tribute to the farsighted policy which anticipated the scientific need of a better knowledge of the changes in sugars during storage. Two of these calls for consultation have come during the past year; one of them from the American Beet Sugar Company of Nebraska, and the other from New York City.

The Production of Industrial Alcohol from Sugar Cane

The large tonnages of cane which can be produced from some of the more densely growing varieties which are included in the variety tests of the Experiment Station, suggest the possibility of their utilization for power alcohol manufacture when the industrial alcohol market and blackstrap prices are more favorable thereto. With the view of determining the yields which might be expected from one of these canes experiments have been conducted during the past grinding season. These experiments have included the study of the optimum acidity to be maintained in the juice and the rate of seeding most conducive to the maximum fermentation efficiency.

Publications

The change in the research projects of this department one year ago, and the adjustments incidental to the new location and the prosecution of the new projects, are reflected in the small number of publications for the year. These are as follows:

(1) Fermentation of Bagasse in Relation to the yields of Industrial Alcohol. International Sugar Journal .28 463-70, 1926.

(2) Some Correlative Data on Cane Syrup Produc-

tion in the United States. "Facts About Sugar." March 27, 1926.

(3) Swells in Canned Syrups and Molasses. "Facts About Sugar." Oct. 1, 1926.

(4) The Storage of Raw Sugars. "Facts About Sugar." June, 1926.

(5) The Fermentation of White Sugars. Submitted for publication, "Facts About Sugar" the latter part of 1925.

In view of the very adequate facilities which have been provided for this department, the prospects for its future are highly encouraging, and we may reasonably look forward to very satisfactory progress in all of our lines of research during the present year.

DEPARTMENT OF ANIMAL PATHOLOGY

Harry Morris, Veterinarian

The work in the department of animal pathology has been continued along the same lines of investigation as in previous years. The major portion of the time has been devoted to teaching and the minor part to experimental work.

Anthrax

The study of growing plants as possible carriers of anthrax spores was completed and published as Station Bulletin 196. The results indicate that anthrax spores were carried from inoculated soil by germinating and growing corn, oats, rice and bean plants. The anthrax spores were carried from the soil on the surface of the plant and not in the plant tissue.

The results obtained in this work should emphasize the great importance of sanitation in the control of anthrax and especially of the necessity for the enforcement of the law in regard to the complete destruction of all anthrax carcasses to prevent soil inoculation.

No general outbreak of anthrax occurred in the state during the past year. Several local outbreaks were reported from certain districts. St. Helena Parish reported the loss of quite a number of animals from this disease. This was rather peculiar because an outbreak of anthrax had not been reported from this Parish for at least forty years.

The University passed another year without the loss of an animal from anthrax. All the animals were immunized against anthrax during the spring months.

Infectious Abortion.

During the past year there was a slight increase in the number of cases of abortion in the dairy herd but the disease continues to be under control. Sanitary control measures have been practiced for many years with excellent results. The present crop of calves is sufficient proof for the above statement. The agglutination test is run at regular periods and all reactions are considered as carriers of the disease.

Parasites.

During the past year intestinal parasites in cattle have done very little harm. The stomach worms were almost eradicated by the dry seasons of 1924 and 1925 in which the rainfall was far below normal. During the past year the rainfall was above normal and this has given the worm proper surroundings for development. Pasture rotation and a clean supply of drinking water will assist in the control of this parasite.

During the past year the study of control measures for parasites in mules has been continuing with the mules on the Sugar Experiment Station. The mules were treated twice during the year. The mules were weighed every week and a complete record of the number of days that each mule worked was kept. The results were excellent. The mules gained in weight while at hard work and colic was practically eliminated from the farm.

During the year all the mules and horses owned by the University have been placed under this system of parasite control. The animals are treated for worms at regular periods, and barnyard sanitation is put into operation. A certain number of animals on each farm are not treated and are used as controls.

Diseases of Poultry.

During the year a poultry department was established by the University. This affords an excellent field for the study of poultry diseases and parasites common to Louisiana. The various methods for disease prevention are being studied. Agglutination tests for white diarrhea in chickens are being made by the department, and this should be an assistance to the poultry raisers of the state.

The usual number of specimens have been received by the laboratory for examination and diagnosis. A large number of inquiries concerning the health of live stock has been answered and several articles have been written for the local press.

DEPARTMENT OF PLANT PATHOLOGY

C. W. Edgerton, Plant Pathologist, (Adams Fund.)
E. C. Tims, Assistant Plant Pathologist, (Adams Fund)
H. H. Flor, Assistant Plant Pathologist (Purnell Fund)
P. J. Mills, Assistant in Plant Pathology. (Special Sugar)

During the year 1926 the work in the Department of Plant Pathology was devoted mainly to a few projects. Additional work was started with funds from the special appropriation for the investigation of sugar cane problems, Sugar cane diseases, tomato wilt, and Sclerotium wilt projects received most attention during the year. The seriousness of the Sclerotium rot of sugar beets caused the Sclerotium project to be revived.

Sugar Cane Diseases

The sugar cane disease situation was about as serious as it has ever been with the possible exception of 1924. The seed planted in 1925 was very poor, due to the borer damage and this was followed by the heaviest rainfall in the last 20 years. The cane came up to very poor stands, due to borer injury, red rot and excessive rains, and growth was very slow until the latter part of the summer. The members of the department spent most of their time during the summer and fall on cane disease problems. The work at the substations was curtailed and most of the time spent at the Baton Rouge station. The usual series of demonstrations were held, showing the value of seed selection.

Selecting strains tolerant to mosaic, was continued for the sixth year. The selected strains of D-74 and Louisiana Purple carried through the fifth year continued to show a high degree of tolerance to the disease. There was enough selected Louisiana Purple cane to plant several acres at Baton Rouge and to plant a number of small test plots in the various test fields over the state. There was not quite as much selected D-74 cane, but more than an acre was planted at Baton Rouge and some plots at the test fields. Selections were started in several other varieties this year.

The root rot complex (growth failure) was serious, especially, in the early part of the growing season. But after September 15, fields that had showed effects of severe root rot attack, recovered to a considerable extent. The work of culturing and examining cane roots from various parts of the state was continued. Experiments were continued in the field and greenhouse, to determine the importance of the fungi, Rhizoctonia, Pythium and Marasmius in the root rot complex. The series of seed treatment tests with organic mercury compounds and other chemicals was continued. The seed treatment work was discontinued at the test fields over the state.

A survey of the sugar cane disease situation over the entire cane belt was made during August and September, supported by special funds from the state legislature. Much valuable information as to the distribution of the root rot organisms, prevalence of mosaic, and notes on growth of cane were obtained from this survey. Some of the data are to be published in a bulletin at an early date.

Tomato Wilt

The tomato wilt project was continued with special emphasis on the growing of stock seed of the wilt resistant strains. A new test plot was started and efforts are being made to get it thoroughly infested with the wilt organism in order that the selected strains may be thoroughly tested.

Sclerotium Wilt

In connection with the experiments with sugar beets, it was found that Sclerotium rolfsii and Rhizoctonia species were causing serious losses in the fields. It was estimated that 70% of the beets in some of the experimental plots were destroyed by these fungi. Examinations were made of a large number of beet plantings and data obtained that may be valuable in controlling these rot troubles. Preliminary experiments were started in the control of the rot diseases of sugar beets.

Changes in the Staff

Dr. E. V. Abbott resigned July 1,1926 to accept appointment as assistant in Iowa State College of Agriculture

Ames. Mrs. H. H. Flor was appointed Assistant Pathologist September 9, 1926. Mr. P. J. Mills was appointed Assistant in Plant Pathology August 1, 1926.

Publications During 1926

C. W. Edgerton. Storm Damage To Cane Varieties. Planter and Sugar Manufacturer. 77;207-210.

C. W. Edgerton and W. G. Taggart and E. C. Tims. The Selection of Sugar Cane. The Reference Book of the Sugar Industry of the World. P. 27-31. Published by Sugar Planter.

C. W. Edgerton, W. G. Taggart and E. C. Tims. The Selection of Seed Cane. Louisiana Agricultural Experiment Station Bulletin 195.

E. V. Abbott. A Study of Microbiological Activities in Some Louisiana Soils. Louisiana Agricultural Experiment Station Bulletin 194.

E. V. Abbott. Scolecobasidium, A New Genus of Soil Fungi. Mycologia 19:29-31.

DEPARTMENT OF RESEARCH CHEMISTRY

J. F. Brewster, Research Chemist.

Cane Juice Clarification.

The report from this Department for 1925 dealt in part with the clarification and treatment of cane juice for the manufacture of table syrup by the use of some well known clarification agents and also by the employment of precipitated chalk with or without using phosphoric acid. Similar experiments have been continued with a view to finding cheaper forms of phosphoric acid or soluble phosphates such as the commercial triple phosphates of the fertilizer industry, some of which may be expected to serve the purpose of clarification.

Sugar Beets

This Department cooperated in the experimental manufacture of sugar from Louisiana sugar beets in the late spring of 1926 to the extent of operating the chemical control laboratory where all the analytical work of the beet campaign was done. The average sucrose content of all the beets sliced was 12.1 per cent. This is to be considered very good in view of the unfavorable weather occurring in the beet-growing season.

Analytical Methods.

Through the cooperation of the Audubon Sugar School several students were assigned to this Department in 1926 and the opportunity was thus afforded to review some of the more recent methods of analysis proposed for the Sugar Industry. The thanks and appreciation of the Department are due these students for their assistance and it is gratifying that the work accomplished by them was accepted by the Faculty of the University as a partial fulfillment of the requirements for advanced degrees.

The Clerget Method with Invertase.

The method of sucrose determination by inversion with the enzyme, invertase, was studied with the assistance of Mr. T. Y. Chou. In addition to checking the work already done upon this subject by others, a table of Clerget divisors was worked out for the method adapting it for use at different temperatures and at different sugar concentrations.

The Determination of Reducing Sugars.

With the assistance of Mr. R. G. Pradhan the volumetric method of Lane and Eynon for the determination of reducing sugars was compared with some of the official gravimetric methods and was found to be very satisfactory.

Raffinose in Louisiana Sugar Beets.

Sugar beets contain a small amount of the trisaccharide, raffinose which has an effect in the analysis of beets not usually taken into account in the routine laboratory methods. It may have a further effect in the recovery of sucrose from beet molasses. In order to determine the amount of raffinose in Louisiana sugar beets a number of samples of cossettes were analyzed using the enzyme method. The analytical work was performed by Mr. E. Infante. The amount of raffinose found varied from 0.0 to 1.4 per cent, the average for the samples analysed being 0.27 per cent. The sucrose equivalent of this quantity of raffinose is calculated to be 0.41 per cent or 8.2 pounds sucrose per ton of beets. This is a plus error in our ordinary methods of sucrose determination.

A Simple Ultrafilter

In connection with the purification of yeast enzymes used in some of the work described above, a simple collodion ultrafilter was devised and has given satisfactory results. A description of it has been offered for publication.

Sugar Beet Tests

The sugar beet tests conducted in June, at the new sugar house of the University, were of value in showing that good white sugar may be made from Louisiana beets and that an experimental scale factory may be operated successfully from the technical if not from the financial standpoint.

New installations are expected to give trouble at the start and the sugar house was no exception. The beet slicer failed to work at first, due to woody beets. This difficulty was overcome by Mr. Munson and thereafter the slicer operated perfectly.

The beet scales got out of order three times and several tons of beets were sliced of which there is no record. It is therefore impossible to calculate accurately, the yield of sugar on the total amount of beets sliced during the short campaign. Furthermore, the house was operated intermittently instead of continuously; and the unaccountable losses from this cause were naturally high. During the time the slicer was giving trouble several tons of beets were lying on the unloading platform and a large percentage of them rotted. These were purposely sliced in order to learn what might be expected. The result was that no sugar was grained in the pan from these beets, although a small amount of grain was started. Due to poor circulation in the pan the grain could not be forced to grow and the mass had to be run to the crystallizer. The subject of spoiled beets will be considered separately.

The manufacture of sugar from beets is no longer a technical problem. The processes are thoroughly standardized so that, given sound beets, with reasonably high sucrose content, the successful operation of a factory will depend upon installing standard machinery and apparatus, and employing men from superintendent down, who understand the business.

Yields

It is well known that the past season in which the beet-growing experiments were conducted, was the worst that could be experienced. Due to excessive rainfall and cold weather a large percentage of the beets were spoiled. Nevertheless it was attempted to work spoiled beets along with sound ones, with the result that sugar yields were exceptionally low.

In a test run in which 64 tons of beets were sliced, 8,176.5 pounds of white sugar were recovered, or 127.6 lbs.

per ton of beets. The results of this test are shown in the following table:

Table I

Sugar Beet Test Run June 17-19, 1926

	Lbs.	Lbs. Sucrose	Lbs. Sucrose lost	Per Cent on Beets
Beets	128461	15555		12.109
Diffusion Juice	175805	14901		
Loss :		654		
In Pulp			294	0.23
In Waste Water			206	0.16
Undet. (in Fumes?)			104	0.08
Press Cake	13230		437	0.34
Total losses above sources			1041	0.81
White Sugar—1st		4490		
White Sugar from Raw		2356		
White Sugar		1220		
Total		8066		6.28
In Crystallizer and String Mol. not Recovered		4858		
Total Losses		2631	2631	2.04

SPOILED BEETS

A very large proportion of the beets received at the sugar house in this campaign was spoiled. The cause of spoilage is a subject belonging in the province of the plant pathologist and only its effects upon sugar house operations need be discussed here. Two types of spoilage were noted in the beets and some analyses were made to determine their effects upon the plant tissue. One type, which for our purposes may be called black rot, was more or less superficial and had led to a darkening of the skin without deep penetration into the beet. Analysis of whole beets so affected showed that no reducing sugars had been formed and practically no acidity. No sucrose was present in the darkened portions cut from beets and analyzed separately. Beets affected with the other type of rot were covered with a white mold growth, the tissue of the beet, in places sometimes of large area, was soft and watery and the rot had usually penetrated to a considerable depth. Analysis of beets affected with the latter form of rot yielded the following results:

	Sucrose	Purity	Reducing Sugars
No.	%		%
1	4.59	37.1	12.5
2	5.30	47.8	6.96
3	9.10	....	....

It is a fact well known to sugar chemists that lime used in the clarification of beet juice reacts with reducing sugars, decomposing them and forming lime salts. It has been calculated that from 100 parts of reducing sugars there are formed 109 parts of lime salts, and that these lime salts are capable of preventing the crystallization of several times their own weight of sucrose. In other words the lime salts are melassegenic. Aside from this a part of the decomposition products of reducing sugars are of a gummy nature and are highly viscous. When sugar liquors containing these substances are concentrated in the vacuum pan circulation practically ceases and development of grain is out of the question. This occurred in the first run at the sugar house when a large quantity of spoiled beets was purposely sliced. A small amount of grain was "caught" but attempts to get it to grow were unsuccessful. The charge had to be run to the crystallizer and even then after graining the sugar was difficult to dry. Some spoiled beets entered nearly every run and the low sugar yield is traceable to this cause.

Beet spoilage is a cause of trouble in all beet sugar producing countries but in Europe and the Northern United States it results from freezing after which rot producing organisms become active as happens with frozen sugar cane in Louisiana. In order for the crop to be successful here the harvest should be finished before hot weather begins. Beets injured by the black rot referred to above or in any other way will deteriorate more quickly in hot weather and they should enter the sugar house as soon as possible when harvested.

PURNELL FUND

The Purnell fund is a Federal fund, appropriated under the Purnell Act of 1925. The projects for investigation under this fund are approved by the United States Department of Agriculture, as are those of the Hatch and Adams funds. It is not required that the work should be of as high standard, in a technical way as for the Adams projects, but it is our desire to make the projects as practical as possible, in increasing our ability to deal effectively, in a fundamental way, with the farm problems to which they pertain.

There is some overlapping with other funds. H. J. Rodriguez, working under this fund, gives his entire time to the study of seedling canes. This overlaps on Hatch projects and on Special Sugar Cane fund projects.

Part of the administrative expense is paid from the Purnell fund.

SUGAR BEET EXPERIMENTS FOR 1926.

By D. N. Barrow.

In accordance with plans formulated by a committee of the American Sugar Cane League and the Experiment Station it was decided to have planted 100 acres of Sugar Beets for the purpose of testing the feasibility of growing this crop in the Sugar Section of the State. These beets were to be distributed in about five acre lots throughout sugar producing parishes. It was agreed that the grower of the beets would stand all expense including purchase of seed, preparation of the land, cultivation, and harvesting, and delivery to the railroad. The Station on its behalf was to pay the freight and manufacture the beets into sugar. The only expense that the station undertook to defray in the growing of the beets was the superintendence and direction of the planting and cultivation which duty was delegated to the writer.

It was planned to commence planting in late October but was late when these plans were formed and it took some little time to arrange for acreage. After this was done, delay was experienced in getting the land prepared as the fall was unusually wet.

Owing to these unavoidable delays it was not until the 10th of November that the first field was planted. Rains continued all throughout planting season allowing planting not more than one or two days per week and consequently many fields were not planted until late in December. Not only were the rains unusually frequent but they were of exceptional severity, in many instances washing the freshly planted seed out of the ground and actually flooding the land for days at a time.

Only a few of the fall plantings were saved and none of these showed over seventy-five percent of a stand. The rains accompanied by unusual cold continued all during December, January and February and the replantings in February were made under the same adverse conditions and with not much better success.

Method of Soil Preparation and Planting.

As soon as the acreage was determined upon those agreeing to plant the beets were instructed to select well drained soil of medium to light texture that had had a good crop of cow peas or soy beans turned in. They were instructed to break this land as deeply as could be, harrow it thoroughly and then to lay it off in rows.

In order to determine the best distance of these rows and method of cultivation, three general methods were adopted in the laying off of the land.

Some of the rows were laid off thirty inches apart, others were made three feet while still others were made six feet wide, it being the plan on such to plant two rows of beets thirty inches apart on top of the 6 foot row. The incessant heavy rains of the fall soon demonstrated beyond question the error of this method. With such plantings two things immediately happened. When the flooding rains came upon the beds so planted they either washed the seed up or washed such a large amount of dirt from the middle of the row upon the plantings that the young plants were unable to push their way through and it was necessary the following February to replant all such fields.

Better success was secured with both the thirty inch and the three foot row plantings but owing to the difficulty of cultivation of the former and the poorer drainage following the use of the narrower row, the cultivation season soon demonstrated the superiority of the three foot row.

How the Planting Was Done

Few farmers were accustomed to handle such small seed and practically none were provided with suitable planters so it was decided to purchase one or two planters and to transfer these from field to field in so far as this was practicable. One single row hand Planet Jr., and one two row power planter of the same make was purchased.

The car in which the writer traveled was equipped with a half ton trailer and these planters were moved from one field to another therein thus planting about fifty acres. The other acreage was planted partly by hand and partly with corn planters specially adapted for the work.

While there was no lack of willingness and of intention on the part of the farmers to prepare the land correctly in few instances was this done owing to the total lack of experience on their part in the planting of small seed; and almost invariably the land had to be reprepared after the writer arrived upon the ground. This not only delayed the planting but is largely responsible for the difficulty of securing good stands. Though the land was rolled repeatedly after bedding, both before and after planting, the soil was nevertheless very loose and much more susceptible to washing by the torrential rains that almost invariably followed the putting of the seed into the ground.

The unfavorable weather that prevailed so constantly during the November planting continued without abatement during the whole winter to the extent that it was possible to give the fields very little cultivation. Poor stands were obtained in most of the fields and when February came it was decided that most of them should be replanted.

In a few instances where it was estimated that seventy-five percent of the fall planting had lived through the winter interplanting was practiced. This however, was soon found to be wasted labor. While none of the beets ever made the rapid growth that we expected yet the fall plants maintained such a superiority in size over the February seeding that the latter were never able to make much growth and added very little to the final tonnage but did prove a very great detriment to proper cultivation.

The weather during February and early March was almost a duplicate of the fall planting but a little greater warmth prevailed and so the average of stands on spring plantings was somewhat better than that of the fall.

Cultivation

The plants were blocked out to bunches every eight to ten inches as soon as the weather would permit after they had formed four to six leaves and the ground stirred shallow along the side of the drill. Blocking was followed in about ten days by thinning to one plant to the hill. With the inexperienced labor available this proved a very difficult operation to have properly done and it was frequently necessary to go over the fields several times before the job was completed in even a very indifferent manner. Blocking and thinning after the planting are the most important operations in the growing of a beet crop. If the plants are not properly thinned there will not be sufficient room left for their best development. Again if not brought to a stand of one plant in a hill the same difficulty will be experienced as crowded beets cannot make the growth nor are they able to develop the sugar. On the other hand if not sufficient plants are left upon the ground it will be impossible to make the tonnage.

After thinning to single plants the after cultivation is simple and inexpensive, consisting chiefly in the maintenance of a shallow mulch for the conservation of moisture and the destruction of grass and weeds. With normal growing plants one hoeing after the final thinning should be sufficient. Care should be taken not to cultivate any deeper than is necessary to accomplish the above mentioned purposes.

Few planters were provided with suitable implements for cultivation of beets and as the acreage was small the purchase of such was not urged. Most of the available implements on a sugar plantation are large and heavy.

The beet is very susceptible to root injury by deep cultivation. Despite all warnings and efforts to the contrary much of the cultivation was entirely too deep and accompanied as the growing season was by excessive rain and abnormally low temperature, the beets never did make as rapid growth as in former years.

Diseases

During the first part of April the crop made fair progress and it began to look as though we could hope for the success that had so consistently followed the planting of the sugar beet for the previous six years, but the excessive rains and errors of cultivation were bound to take their toll.

About the latter part of April a few plants began to die. The trouble was diagnosed by the Plant Pathologist as root rot and was attributed to the constant saturated condition of the soil accentuated by cool weather and errors in cultivation. The disease spread rapidly. There was no remedy except better drainage and aeration of the soil and this was rendered impossible by reason of the fact that rains continued until well into May. As the disease progressed there was ample proof that it was caused by lack of drainage. Low spots in fields were invariably the first to be affected and even at harvest time the rows near the ditch banks, those portions of the fields that were higher and even the ends of the rows along the quarter drains showed very much less disease.

The taking of samples for analysis began about the middle of April and was continued at intervals of about ten days until harvest began. Despite adverse conditions of growth the plants showed a rapid gain in sugar until by the middle of May there was sufficient sucrose and a sufficiently high purity to warrant their being worked. From causes that could not be controlled the factory was not ready until the first week in June. The beets continued to gain in sugar during this waiting period but unfortunately the spread of rot also continued and much tonnage was lost from this cause.

Harvesting

As soon as the factory was able to operate harvesting began. In an effort to assist in the enterprise, the John Deere Plow Company had equipped its agent for this territory with a regular beet lifter which Mr. J. M. Elliott, their agent, transferred from field to field in a Ford truck and with which most of the beets were dug. Where it was not possible to dig with this machine, they were dug by plowing a furrow from both sides and then pulling by hand. While both operations were accomplished with little cost yet of course the harvester was far more efficient and economical.

Shipping the Beets to The Factory.

One very important part of the demonstration and one about which grave doubts had been advanced was how the beets would stand shipment in railroad cars during the hot weather that can always be expected at their time of maturity in this section.

In order to give them every chance possible either stock cars or ventilated cars were used. All uneasiness upon this point in the case of sound beets was soon dispelled as it was found that good sound beets kept with no appreciable deterioration either as to soundness or sucrose for a period of more than a week. In the case of beets affected with rot the case was different. With such fields it is impossible to discard all diseased beets. Many of the beets from such fields, though not showing any outward sign of the disease are really infected therewith; and when once placed in piles in a car even though protected from the sun and well ventilated the disease develops very rapidly and such beets drop rapidly in their sugar content and purity. Not only are such beets themselves rendered unfit for the manufacture of sugar but the disease rapidly spreads to otherwise healthy adjoining beets and in forty eight hours after loading such beets are unfit for the manufacture of sugar.

Much trouble was expected with the railroads in getting prompt delivery of the beets and as nearly all fields were more or less affected with rot, the quality of the beets received at the factory was much below what it should have been.

Acreage Yield and Cost of Production.

Following is a list of those participating in the work together with their acreage, the yield per acre and the cost per ton to deliver into cars in so far as it was possible to obtain this information.

In studying this report it must be remembered that the November plantings were, with few exceptions, a poor stand while the February planted beets never were able to make anything like normal growth. Again with few exceptions both plantings were severely affected by rot, the spring plantings particularly.

Glenwood Sugars, Napoleonville, 3.5 acres planted November. Plowed up and replanted in February, yield 1.38 tons per acre. Cost per ton $17.85, percent stand 90, percent rot 70, type of soil light sandy loam.

R. T. Gibbens, Minerva, La. Planted in November. Plowed up and replanted in February. Acreage 4.8 yield per acre 3.2; cost per ton $3.00, percent stand 70, percent rot 15. Type of soil light mixed loam.

J. W. Supple planted November, interplanted in February, acreage 4.8. Yield per acre 6 tons. Cost per ton 6.66, percent stand 80, percent rot 60. Soil sandy loam.

S. J. Gianelloni, Burtville. Planted November, plowed up and replanted in February. Acreage 2, yield per acre 5 tons. Cost per ton 6.92, percent stand 70, percent rot 40, soil light, sandy loam.

A. Wilberts Sons, Plaquemine, planted in November, interplanted in February, acreage 1.5, yield per acre 6.89 tons, cost per ton 5.40, percent stand 60, percent rot 40. Type of soil, light sandy loam.

Louisiana State Penitentiary, St. Gabriel, planted in November. Interplanted in February, acreage 4.5, yield per acre 11.25 tons. Cost per ton 2.25, percent stand 80, percent rot 40, soil sandy loam.

Milliken and Farwell, Smithfield. Planted in November. Replanted twice in February, Acreage 3.63, yield per acre 2.41, cost per ton 4.60, percent stand 50, percent rot 60, light sandy loam.

Standard Sugars, Thibodaux, La., Planted in November, interplanted in February, 6 acres yield per acre-cost per ton 10.55, percent stand 60, percent rot 70, soil mixed sandy loam.

Milliken and Farwell, Waterford, La., Planted November, interplanted in February, Acreage 4.65, yield per acre, 4.51 tons. Cost per ton, 3.98. percent stand 75, percent rot 30, soil mixed sandy loam.

Louisiana State Penitentiary, Angola, La., planted in January, Acreage 5, yield per acre 4.17, percent stand 75, percent rot 30, soil mixed sandy loam.

H. N. Sherburne, Sherburne, La., good stand, no rot, planted in November. Acreage 5, yield per acre 25 tons, percent stand 90, percent rot 10, soil light sandy loam.

E. J. Gay, St. Louis Plantation, La. Planted in November, replanted in February. Acreage 3, yield per acre 3.38 tons, percent of stand 60, percent of rot 60, soil sandy loam.

Milliken and Farwell, Westover Plant. Planted in November. Replanted in February. Beets planted on 6 ft. rows and badly rotted. Soil, sandy loam, acreage originally planted 5.

B. Thibaut, Napoleonville, La. Planted in February, acreage 1.5, yield per acre 1.5 tons. Good stand but heavily rotted. Soil sandy loam.

Godchaux Sugar, Reserve, La. Planted in February, Acreage 3.7, yield per acre 1.5 tons. Good stand and heavily rotted.

A. H. Gay, Plaquemine, La. Planted in November, replanted in February, acreage planted 1.5, beets planted the last of February and badly rotted. Soil, light sandy loam.

Picard and Geismar, Geismar, La. Beets planted in November, and replanted in February. Acreage planted 3.

Poor stand and badly rotted. Yield per acre, not determined, but probably not over 3 tons.

Picard and Geismar, Dutchtown, La. Planted in November, replanted in February. Acreage 2.5, yield per acre 3 tons, soil, clay loam.

Willie Bergeron, Napoleonville, La. Planted November, replanted in February. Acreage 2. Beets rotted so badly that they were not harvested. Soil, sandy loam.

Dugas and LeBlance, Paintcourtville, La. Acreage 5. Beets planted in November on buckshot land. Replanted in February stand poor and badly rotted and not harvested.

Cinclare Central, Cinclare, La. Planted in November, replanted in February. Acreage 5, good stand but badly rotted. Yield per acre not determined. Percent stand 75, rot 35%. Soil light sandy loam.

Dr. W. D. Haas, Bunkie, La. Planted March 2nd, good stand, little rot but owing to dry weather, beets grew very slowly and tonnage did not warrant digging as they matured after the factory had closed down. Percent stand 90, percent rot 0, soil sandy, loam.

H. K. Bubenza, Bunkie, La., 1.25 acres beets planted March 2nd. Good stand but rotted badly and matured too late to work in factory. percent stand 60, percent rot 60, soil, sandy loam.

J. B. Levert, Shirley, La. Planted March 2nd., 3 acres, splendid stand and practically no rot, but grew very slowly owing to extreme dry weather and not harvested for factory. Soil, clay loam.

C. M. Roy, Opelousas, La. Planted in November, 2.5 acres. Poor stand and beets severely injured by hail. Little rot but beets not harvested. Percent stand 50, percent rot 20, clay loam.

Sterling Sugars, Franklin, La., 2 acres. Beets not planted until April 15th. Good stand.

Dr. R. O. Young, Youngsville, La. Beets not planted, owing to unfavorable weather.

Dr. J. W. Starring, Baton Rouge, La., 3 Acres. Planted in November and replanted in February. A very poor stand secured from either planting and in May transplanting was resorted to thereby reducing the acreage to less than two. The transplanted beets grew fairly well but never attained much size. They were so late in making growth that the factory had shut down before they were ready for harvest so no tonnage was secured. Stand (after transplanting) good. Disease 10%.

The variety used in all of the above plantings was Klein Wantzleben, secured from the Great Western Sugar Co., of Denver Colorado.

Louisiana Experiment Station, acreage 5 yield per acre 7.36 tons. Planted in November, interplanted in February, percent of stand 90, percent rot 20, soil mixed sandy loam. These beets were badly flooded several times during their growth.

Louisiana Experiment Station, acreage 3, yield per acre 8 tons. Planted in November. Interplanted in February, percent of stand 80, percent of rot 15. Black Buckshot land.

The history of these beets is rather remarkable. The land upon which they were planted was the blackest and stiffest upon the place. It had been in cotton the year before and was prepared with difficulty for the fall planting. Heavy rains followed the planting and the land was covered with water for days several times during the winter. About fifty percent of a stand was obtained from the fall planting and interplanting was done in February without disturbing the fall plants. The rains continued with the floodings until well into April at which time the plants seemed very sick. They were cultivated and hoed out and took on new life and made a remarkable growth. Yield 14 tons per acre.

If the tonnage secured this year is to be taken as typical of what can be expected every year there would be no further inducement to continue the work. Fortunately the cause of the low tonnage is very apparent when we compare these yields with those secured during the former years of experimentation and remember that the records show that the season just passed has not been duplicated in this state for eighty years. We have grown beets in the past with heavy rainfall at periods during their growth but such periods were not accompanied by such persistent low temperatures nor has the total rainfall ever equalled that of the past growing season. The plant Pathologist tells us that this heavy infestation of rot is directly attributable to cold water logged soil conditions. This statement is verified by field observations.

The best results in tonnage come from the field of H. N. Sherburne, at Sherburne, La., which produced twenty five tons per acre. These are new lands having only been in cultivation long enough to have eliminated the stumps. The field in which these beets were planted was particularly well drained by reason that is was located between two deep bayous not over four acres apart thus affording ample outlet for all surplus water.

In further testimony that the presence of rot is directly attributable to a season that is extremely rare we might cite the tonnage of former years.

The yield of beets planted upon alluvial soil in 1922 and harvested in 1923 was 19.9 tons per acre. The Fall plantings of 1923 gave 18.0 tons in 1924 and the plantings of 1924 gave 23 tons in 1925. It is worthy of note that the season of 1923 until well into the spring was unusually wet and that the one of 1924 was the driest year we have ever experienced. Yet the tonnage as well as the sucrose was entirely satisfactory.

Varieties.

In addition to the regular field crop eleven varieties of beets were planted in order to test their adaptability to our conditions. These varieties were subject to the same unfavorable weather conditions as the field crop and are hardly comparable in so far as yield per acre is concerned. A better idea of their adaptability can be gained by a study of their sucrose, purity and the average size of the beets analyzed.

Analysis and Acre Yield of Sugar Beets Varieties Grown on the Experiment Station 1925-1926

Variety	Analysis			Beets used		Sugar in	Tons per
	Brix	Sucrose	Purity	No.	Weight	Beets	acre
2823-	17.07	14.13	82.77	27	565	13.19	5.19
8469-G	17.09	14.16	84.61	27	582	13.65	4.70
Glostrop	16.51	13.75	83.33	29	434	13.30	4.39
2516-G	16.07	13.52	84.13	26	655	12.88	5.00
Erhard-Fredrickson	16.75	14.12	84.30	27	693	13.82	3.79
Dippe-Mixed	16.94	14.29	84.30	30	510	13.61	4.10
LaGraine-Selectionee	17.48	14.99	85.85	28	544	14.30	4.98
Kleinmanzleben-R & G Original Special	17.05	14.29	83.81	24	639	13.63	4.27
Dahlberg	17.86	15.32	85.70	30	314	13.83	1.75
8538-G	17.17	14.31	83.83	28	571	13.13	4.29
Ceres Martin	17.45	14.67	82.98	25	667	13.82	7.05
Check-Kleinmanzleben	16.82	14.24	84.65	30	389	13.65	2.39

ANALYSIS OF SUGAR BEETS

Date 1926	Location	Analysis Brix	Sucrose	Purity
5-10	Picard & Geismar, Dutchtown	14.10	11.80	83.70
5-26	Picard & Geismar, Dutchtown	17.95	15.15	84.40
5-10	Picard & Geismar, Geismar	12.97	12.37	79.90

5-26	Picard & Geismar, Geismar	16.55	13.56	81.90
5-19	J. W. Supple, Bayou Goula	14.55	11.51	79.10
5-29	J. W. Supple, Bayou Goula	16.45	13.41	81.50
5-20	A. H. Gay, Plaquemine	14.89	11.75	79.00
5-29	A. H. Gay, Plaquemine	13.61	10.29	75.60
5-21	Godchaux Sugars, Reserve	14.07	11.74	79.90
6-11	Godchaux Sugars, Reserve		13.04	83.30
5-22	Waterford Pltn. Killona	15.75	12.86	81.70
5-26	B. Thibaut, Napoleonville,	14.55	11.15	76.60
5-26	Dugas & LeBlanc, Paincourtville (Black Land.)	14.05	10.98	78.10
5-26	Dugas & LeBlanc, Paincourtville	15.00	12.40	82.70
5-29	J. H. Laws, Cinclare	14.90	11.61	77.90
5-29	St. Martin & Perret, Vacherie	15.50	12.85	82.90
5-27	Abbey Pltg. Co., Thibodaux	14.80	11.94	80.70
5-27	Greenwood Plt. Thibodaux	14.55	11.85	81.40
5-24	Sherburne	15.45	12.79	82.80
7- 1	Sherburne	17.81	15.12	84.80
7-15	Sherburne	16.30	13.70	84.00
6- 9	J. B. Levert, Bunkie (Sucrose in beets)		12.20	82.70
6-26	J. B. Levert, Bunkie (Sucrose in beets)		13.80	
7-29	J. B. Levert, Bunkie	17.18	14.07	82.00
7-15	J. B. Levert, Bunkie	16.48	13.46	81.70

Date 1926	Location	Analysis		
		Brix	Sucrose	Purity
6- 9	C. W. Roy, Opelousas (Sugar in Beets)		11.60	78.40
6-26	C. W. Roy, Opelousas (Sugar in Beets)		11.70	
7-23	G. B. Reuss, Hohen Solms	16.03	13.30	82.90
7-31	G. B. Reuss, Hohen Solms	16.48	13.65	83.80
7-10	G. B. Reuss, Hohen Solms	16.82	14.18	84.40
6-18	G. B. Reuss, Hohen Solms	18.40	15.36	83.50
7-15	Dr. Haas, Bunkie	17.66	15.53	88.00
6-26	H. K. Bubenza, Bunkie (Sucrose in Beets)		15.60	

7-15	H. K. Bubenza, Bunkie	15.40	12.44	80.70
7-17	Chas. Thibodaux, Brusly	16.58	12.54	75.60
5-24	La. State Penn. St. Gabriel	12.35	9.56	77.40
5-31	La. State Penn. St. Gabriel	15.60	13.58	87.10
5-24	S. J. Gianelloni, Burtville	13.20	10.10	76.50
5-24	J. S. Starring, Baton Rouge	12.55	9.26	73.70
5-26	La. Exp. Station, Baton Rouge (Black Alluvial Land)	16.70	13.94	83.50
7-22	La. Exp. Station, Baton Rouge	15.12	11.81	78.20
5-26	La. State Penn. Angola	15.30	12.54	81.96
5-26	S. J. Munson, Napoleonville	14.80	12.27	82.90
5-26	R. T. Gibbens, Schriever,	14.50	11.15	79.30

SEASON 1926-27

In order to get the consensus of public opinion as to whether it was worth while to continue the beet experiments a convention of parties over the state who had shown an interest in beet growing was called to meet at the station in August, 1926.

At this meeting a preliminary report of the work and results for the 1925-6 crop was made and the subject thoroughly discussed. It was the unanimous opinion of those assembled that these results were far from discouraging and that the work should be followed up upon even a larger scale. After thorough discussion plans were made for the planting of two hundred and fifty acres of beets for the crop of 1926-7. Fifty acres of this was to be planted by the Experiment Station divided equally between the uplands and lowlands. A form of contract was drawn up for the growing of two hundred acres of beets by farmers distributed throughout the sugar section of the state. By the terms of this contract the station agrees to pay the value of one hundred pounds of raw sugar to the growers per ton of beets delivered on nearest railroad track with certain restrictions as to sugar content consisting of a premium for beets averaging over 13.5% sucrose and a deduction for less with the privilege of rejection after the content falls below 12%. The idea of the contract is that the price paid will be sufficient to reimburse the grower for his trouble and at the same time leave sufficient margin for the expensive factory of the station to operate without using funds otherwise appropriated.

The writer whose time heretofore had been divided between the beet work and the direction of the Sugar Cane Test Fields was relieved of the latter work and put in complete charge of the beet work both in the field and upon the stations.

After studying the problem from all angles it was decided, with the advice of the Director, that the work for the coming year at the Station should consist of the testing of all varieties obtainable, about 26 fertilizer plats so as to make a study of the fertilizer requirements of our soils for beets, and the growing of the allotted acreages on the hills and lowlands.

The field plantings were divided between two varieties. "Klein Watzleben" had been the longest tested variety but a French Variety, "La Graine Selectionee" had made such a favorable showing in former tests that it was decided to make the field test with both varieties.

Early in August orders were placed for a ton of each variety of seed with the stipulation that these seed were to be delivered to us not later than October 1st.

In addition to the supply for regular field planting small lots of forty different varieties and strains were ordered from every available source for making the variety tests.

Despite the terms of the agreement for the purchase of the field supply and despite all efforts to expedite their delivery the main supply of seed was not delivered to us until the twentieth of October.

August and September and the first part of October gave favorable weather for the preparation of the ground for planting.

Unfortunately however few planters would begin this preparation before the arrival of the seed and under the circumstances it was not possible to deliver these seed to them before the last week in October.

By this time the cane harvesting season was upon them and in addition periodic rains set in which interfered very materially with the preparation and planting. Consequently only about one half of the two hundred acres to be grown outside of the Station was planted up to the 1st of January 1927.

Little difficulty was experienced in securing stands upon this area. Some few fields that were just coming out of the ground were killed by a temperature of 18 on the 12th of January but all beets that had attained a growth of four leaves came through this experience with slight injury and all fields where the plants were killed together with some addition have been replanted.

The same difficulties that delayed the plantings away from the station were experienced at the station. In the hills the land assigned for beets had grown a crop of soy beans many of which were variety tests and had to be saved. The periodic rains delayed their removal and consequently the preparation of the land and the planting of of the beets.

Despite constant delays and disappointments from this cause we succeeded in getting about twenty of the assigned acres planted by the first of January. With the exception of two fields little difficulty was experienced in securing stands and though many of the plants were just coming up at the time of the freeze of January 12th none were injured thereby the temperature upon the hills not going as low as in the bottom lands—twenty degrees being the minimum.

With such fields as did come to a poor stand either interplanting or in extreme cases replanting has been resorted to and we now have our full complement of twenty five acres in the hills up to a good stand and growing nicely.

Among the first work done in the uplands was the planting of varieties and the putting out of the fertilizer tests. This was done on the 19th of October. Favorable weather brought the plants up promptly and to a perfect stand and in less than two weeks the effect of the various combinations of fertilizer began to be apparent. In fact this was apparent even in germination.

Never before in a life time's experience in fertilizer experimentation has the writer seen such marked results. Very much to our surprise a casual glance will convince even the most skeptical that the dominating factor in the stimulating of early growth in the hill lands is phosphoric acid. The phosphoric acid plats have not only outgrown all other combinations but actually germinated more promptly and came out of the ground with greater vigor. At the present time all phosphoric acid plats are twelve inches high and growing vigorously, while those plats containing only nitrogen or potash or both in combination are slightly better than the checks, about four inches high and are not growing nearly so vigorously. In the case of potash (kainit) there seems actually to be some inhibition as in a number of instances the potash plats are not so vigorous as the checks.

This series consists of 26 combinations including four checks and is repeated three times the plats being located in different sections of the field.

The beneficial effect of posphoric acid was so pronounced that early in December it was decided to fertilize all the beets upon the hill with four hundred pounds of acid phosphate per acre. Where the plants were already up this was applied on the side of the drill. Where the plantings had been already made but the plants not up, the phosphate was applied right on top of the plantings and where seed had not been planted it was applied right ahead of the planting on top of the row and harrowed in.

The wisdom of this was not long in being demonstrated for in every such instance the plants germinated more promptly and vigorously and have maintained a vigorous growth despite unfavorable weather conditions. At the time of writing we have upon the hills twenty six acres of beets ranging from twelve inches high to those just germinating—all a good stand and growing vigorously. This hill crop will practically be laid by the first to the fifteenth of March.

With the alluvial lands of the station we have not been so fortunate. The higher and better lands had already been allotted to other work when the decision to plant the beets was made so the land that was available for beets was not so well prepared nor so well drained. While our rainfall was not near so abundant as the previous fall yet such rains as we did have were so spaced that the beet land was kept too wet for preparation and planting until about the middle of December.

Ten acres were planted about this time in fair condition and good stands secured but unfortunately the freeze of January 12th killed all these plantings. The succeeding days of January were excellent for soil preparation and planting and all these fields .together with five additional acres were promptly replanted and are now up to a good stand. Owing to seepage from the river the rest of the land originally assigned to beets has been constantly too wet for plowing and other land is now being prepared therefor.

One field of black land that had been in beets last year was in good condition on the twentieth of October and was planted. Dry cool weather caused only an indifferent stand and in the latter part of November interplanting was resorted to. The two plantings produced a splendid stand but the younger plants were killed by the January freeze. Since then this land has been too wet from river seepage to be cultivated but interplanting has again been resorted to and should the river recede in time hopes are entertained that a crop of beets can yet be grown upon this land. The older plants stood the low temperatures splendidly and have all recovered from its effects but are not growing due to saturated soil and inability to work them.

Duplication of the fertilizer and variety work referred to upon the hill lands has been followed in the alluvial lands.

The work at the station has required so much of the writer's time that he has not been able to give the field work the supervision wished and that it should have received. Had this been possible we would probably have a larger acreage planted and up in the field.

At present we have about one hundred and eighty acres of beets planted in the state all up to a stand and growing well. There are thirty or forty acres that will be planted by the first of March and with favorable growing season these late plantings should make fair growth so it looks as though we should go into the harvesting season with a two hundred to two twenty five acreage the majority of which is already safe barring unusual weather conditions.

With anything like our usual weather conditions from now on it looks as though we are going to be able to give the subject of sugar beet growing a very thorough and exhaustive test this year.

ENGINEERING DEPARTMENT

J. J. Munson, in charge.

Cane Table Syrup Making

In accordance with our outline of November 25, 1925, we have proceeded to carry out, as far as possible, the experiments on syrup making. It will be recalled that an open copper syrup pan was installed in our sugar house for the purpose of making syrup. This, together with other equipment that has been especially arranged, was used in carrying out this work.

Referring to the outline mentioned above, it may be seen that the first item was to determine the effect of the depth of boiling on color and flavor of syrup. An attempt to carry out the experiment relative to this, concentrating finally in the open pan, resulted in a very dark syrup, even for the very lowest depth of boiling, which in this particular case was one inch. We attributed the dark color to the low purity of the cane, that was used. This purity was an average of 57. The low depth should have given the lightest color syrup. This being known without doubt, the experiment was discontinued for the reason that the purpose was to determine the difference in color of syrup for the different depths of boiling, knowing that the low boilings would give some better color. It is thought that with normal cane there will be considerable difference in color for these different depths of boiling. However, this is not known definitely.

In this experiment there was no clarification used. The raw juice was taken directly into the open pan and skimmed. Indications are that syrup made in an open pan by skimming for the clarification will be dark and strong in flavor, regardless of the depth of boiling, unless the purity is high.

The second and third items in the outline were to determine whether or not it is best to concentrate from juice to syrup in the open pan, or to boil to a light or semi-syrup in the open pan and do the final concentrating under vacuum. Two experiments were carried out, boiling and skimming raw juice in the open pan, carrying the concentration to an average of 21 brix and then boiling to final syrup in the vacuum pan under 26″ of vacuum. In each case this resulted in a lighter color syrup with a milder flavor than boiling to final syrup in the open pan. During this experiment observations were made on the different depths of boiling to the semi-syrup from 1″ to 10″ and for this range there seems to have been no difference in the quality of the semi-syrup. The question of the depth of boiling was also closely observed on all of the experiments on making semi-syrup on the open pan with the same results. The purity of the juice used for these experiments was 61 and this high purity compared with the first experiment would possibly have resulted in a somewhat lighter syrup in any event.

Two experiments were run on sulphur and lime clarification, about the same as is used for making sugar in some cases. That is to say, the juice was sulphured to an acidity of about 3-1/2 c.c. and limed back to an acidity of about 1/2 c.c. This juice was passed through the double effect evaporator and concentrated to an average of 12 Be, then passed through the open copper pan for heat treatment where it was skimmed. The concentration was only slightly increased in the open pan, about 1-1/2 Be. The semi-syrup was then taken into the vacuum pan and concentrated. The color was lighter than any of the previously made syrup, but the usual sulphur taste was present. The main purpose of running this experiment was to obtain a syrup for the low purity cane, with which to compare the syrup that was made by other methods, as there is no doubt about making a light syrup with Sulphur and lime clarification when the cane is anything like normal.

One experiment was made on lime clarification alone, the juice being brought from its original acidity to juice about neutral. The method of boiling was the same as that on the two sulphur tests and resulted in a syrup darker in color than the sulphur and lime method produced, but somewhat milder in flavor.

The result of the first experiment on depth of boiling, concentrating to final syrup in the open pan, indicated that it would have been a waste of time to reverse the above method of boiling, that is to say, concentrate to a semi-syrup under vacuum and finish to final syrup in the open pan. Indications were that any attempt to boil heavy syrup in the open pan would result in a dark product for the low purities that prevailed. Therefore no experiments were made along this line.

Seeing that it was impossible to produce a syrup light in color without employing some form of bleaching material, arrangements were made with the Darco Corporation to carry out some tests using their Char. This company had previously indicated that they were anxious to carry on some work in table syrup making, using their product. This is the reason why Darco was selected.

In accordance with the above Messrs. B. T. Nace and E. W. Harris were sent to the University and remained over a period from November 29th, until December 23rd. During this time seven (7) runs or experiments were made using their Darco Char.

Test Number 1 was as follows:—

Mill juice was clarified by filtration over super-cel and treated with Darco. The liquor was then taken into the vacuum pan and concentrated. The quantity of Darco used was 2% on the weight of solids in the juice. There resulted a rather mild flavor syrup, light in color. The purity of the juice used for this test was 61.

In Tests No. 2 and No. 4 mill juice was sulphured, limed, then concentrated to 12 degrees Be. in the evaporator and treated with Darco. The resulting semi-syrup was then taken into the vacuum pan and boiled to final concentration. The purity of the juice used for this test was 59. The sulphur used increased the acidity up to 3.6. It was limed back to about 1 c.c. acidity. The results showed that the sulphuring had practically no effect on the action of the Darco. It seemed that the Darco removed some of the undesirable sulphur taste. The cane flavor was not materially affected by the use of the Darco. The flavor of the syrup, however, did not compare with a high grade open kettle syrup as is often obtained in the small country open pans. This is thought to have been due principally to the low purity of the cane.

In Test Number 3, the mill juice was limed but no sulphur used. It was concentrated to 12 Be. and filtered over Darco. Two percent Darco was used in this filtration.

There resulted a syrup somewhat darker than that from test 2 and 4, but of a slightly better flavor due, possibly, to the absence of the sulphur. Purity of the juice used for this test was 60 and it was limed from its initial acidity back to approximately neutral.

In test 5 and 6 mill juice was clarified and filtered over super-cel. The filtrate was then evaporated to a semi-syrup 21 brix in the double effect, then passed through the brush pan, boiled and skimmed, after which it was filtered over Darco, and then concentrated finally in the vacuum pan. In test 5 the purity of the juice was 61 and in test 6 it was 64.

There did not seem to be any great difference in the syrup from each of the experiments except that from the high purity - 64, or test 6, it was a little lighter and possibly had a little better flavor. Approximately 2% Darco was used in each of the tests. There resulted a syrup in each case lighter than any of the previous tests and of a somewhat better flavor.

Test No. 7 was made with cane produced on the hill land. Its purity was considerably higher than the same kind of cane produced on the low river land. In this particular case the purity was 72. The test was carried out in exactly the same way as 5 and 6. The syrup was considerably lighter and had a better flavor than any of the tests that were made. In this connection it might be observed that while the purity of the cane used in the last test was higher than that of the previous runs, it was still below normal. Cane produced on the hill land should run at least 80 in purity in a normal year and this difference between 72 and 80 would possibly make a great deal of difference in the quality of the syrup made. There was not enough of the high land cane to make a check run, there being only about 12 tons available.

For the low purity cane the tests seem to show that there is a possibility of improving very much the color and flavor of syrup made by using Char. For these low grade juices the results show that the flavor and viscosity of the syrup was not materially affected by the use of 2% Darco on the weight of solids in the juice or semi-syrup. There is no doubt that the use of carbon improved the taste of syrup made from these low grade juices.

It was found that even 2% carbon did not entirely give a color control, that is to say, there resulted a syrup in almost every instance that was a little too dark in color. However, it is thought that with normal cane there will be no trouble in obtaining color control.

It is not known to what extent the flavor and viscostly will be affected using chars in connection with high grade cane for the manufacture of syrup.

The process that gave the best results was as follows:

The mill juice was treated with super-cel and the filtrate concentrated to 12° Be. The semi-syrup was boiled in the brush pan where it was skimmed, then treated with Darco. The filtrate was concentrated in the vacuum pan.

The above results seem to point out that it is desirable to carry the syrup experiment through another year when we are able to obtain cane that is practically normal. There is no doubt that if table syrup is to be made from low purity cane, such as we have had in the past two years, not only more refinements will be necessary in the known processes, but it will possibly be necessary to depart very widely from the methods used in the past.

The last item on our outline of November 25, 1925, calls for the determination of the rates of evaporation in connection with open evaporators. Three tests were run and the results recorded. There seems to be a coefficient of heat transmission somewhat lower than for vertical tube apparatus boiling under atmospheric pressure. Also in the particular type of pan with the flat bottom, that we ran the tests on, the results of the rate of evaporation obtained, or the coefficient of heat transmission, seems to be somewhat lower than for coils. This is thought to be due to the formation of vapor next to the bottom sheet in the pan which increases the resistance to the transmission of heat. The results show that the average coefficient of heat transmission is approximately 195.

The details from which the above general remarks are made are being withheld for the reason that it is expected that enough material will be gathered on this experiment to justify the publication of a bulletin, at which time all data will be given in more detail.

POULTRY DEPARTMENT

By F. C. Old, Poultry Husbandman.
G. W. Knox Jr., Assistant in Poultry.

The Projects in Poultry Husbandry are New

Two projects have been undertaken for a period of three years. The very nature of these experiments, and the lack of experimental data concerning them in the South make a great deal of preparatory work necessary.

The Substitution of Nicotine Sulphate (40% Nicotine) Solution for Tobacco Dust in the Treatment of Roundworms in Poultry.

In this project it was necessary to try different strengths of the solution in order to find the limits of accommodation of birds of different classes and ages. Chickens which showed by examination of feces that they were infested with roundworms were placed in batteries which had dropping pans. The batteries and dropping pans were disinfected carefully and the feces examined after different strengths were administered. The project has gone only far enough to find that there may be considerable danger in recommending this solution generally to the laymen. Unless the solution is mixed thoroughly before it is drawn from the container, and unless the solution is approximately 40%, there is nearly always danger of prostrating the birds and often times there is danger of killing them. The highest limits of the solution which can be given without toxic effects in chickens in individual dose is 9 c.c. of 40% nicotine in a nicotine sulphate solution in 991 c.c. of water. In flock treatment where it is mixed with the mash, it is possible to increase the solution to 10 c. c. of nicotine sulphate solution, 40% nicotine in 990 c. c. of water. No data have been tabulated as to the results of nicotine sulphate.

Iodine suspensoid, after the formula of Chandler, is being used as a check on the nicotine-sulphate solution. It has not been carried on long enough to report data.

The Dressing Shrink of Milk Fatted Poultry With Particular Emphasis upon Classes, Breeds, and Grades of Poultry.

This project has been running actively only two months, and as is the case with the previous project, procedure has not been standardized. It was very necessary for us to devise a fattening ration which would give uniformly good results in the South, and at the same time keep the birds from going "off feed." The ration has not been decided upon, although several thousand pounds of chickens have been fattened. It will possibly take three or four months more to find the desirable ration. It does not seem that there will be any trouble in finding enough chickens to use in connection with this experiment.

COTTON BREEDING DEPARTMENT

H. B. Brown, Cotton Breeder.

Work in the Cotton Breeding Department was started July 1, 1926. The work embraces certain cotton and soil fertility investigations formerly conducted by the Department of Agronomy, and in addition, more extensive cotton breeding and soil fertility work at Baton Rouge and in other sections of the State. An effort will be made to develop or secure better cotton varieties for different sections of Louisiana and to determine the best and most economical fertilizers to use.

During July and August studies were made of the cotton varieties in the variety test at Baton Rouge and of the new strains planted there. Also trips were made through all of the leading cotton growing sections of the State to investigate cotton growing conditions and make arrangements with growers for carrying on certain cooperative experiments in the future. During September and October the cotton grown on the Experiment Station plats was harvested and a number of plant selections made at Baton Rouge and at other places in the State. These selections are to be used in breeding work in 1927.

Results from 1926 Experiments.

The variety tests conducted in 1926 were not very satisfactory, due to the fact that stands were not uniform and fungus diseases and insect pests injured the crop considerably. The leading varieties in respect to value of lint and seed were, given in order of rank:- Miss., Station Trice, Lightning Express, Coker's Cleveland No. 5, Delfos 6102-A2-C3, Klondike Delfos 6102, Deltatype Webber, Delfos 631-B4, Louisiana 63, D. & P. L. No. 4, and D. & P. L. No. 5.

None of the new strains of cotton produced by the Louisiana Experiment Station made a very good showing in the tests or increase fields. The strains were disease resistant and some of them had good staple length, but the lint percentage was low and the strains too late for growing satisfactorily under heavy boll weevil infestation. The fertilizer tests gave no conclusive results. It will be necessary to conduct these experiments for a series of years in order to secure reliable information.

Work For 1927

We have planned to continue, with some slight changes, the two-year rotation, the three year rotation, and the test of various carriers of nitrogen experiments, which were planned by Director Dodson and Professor Kidder. (For a more detailed outline, see the Annual Report of the Agronomy Department for 1925, in the Thirty-Seventh Annual Report of the Louisiana Experiment Stations.) Various fertilizers are used in the rotation experiments. In addition to the fertilizer work mentioned, rather extensive fertilizer tests will be conducted on the lowlands or alluvial soils at Baton Rouge; near Lafayette on prairie soil; near Monroe on the upper Ouachita valley soils; at Calhoun, on typical North Louisiana upland soils; and near Shreveport, on upper Red River Valley soils.

Rather extensive cotton variety tests will be conducted in each of the regions mentioned in the preceding paragraph, while additional breeding work will be carried on at Baton Rouge, Calhoun, and Shreveport.

The alluvial lands in the northeastern part of the State produce much cotton but since this region is comparatively near and has soils similar to the soils at Stoneville, Mississippi, where there is an Experiment Station that is doing much cotton work, it was thought best to work principally in other parts of the State. Results obtained at Stoneville will be of value to the region just mentioned.

Special Appropriation for Sugar Cane Investigations and Other State Funds.

As explained in the general preface, the Legislature made a special appropriation of $25,000 for 1926, and the same amount for 1927 for cane investigations. This was construed as meaning that the first appropriation should run from July 1, 1926 to June 30, 1927, and the second, from July 1, 1927 to June 30, 1928.

The Advisory Committee approved a budget providing $14,000 for cane borer investigations, $6,000 for cane diseases, and $5,000 for supervision of variety tests at the test fields, and for extension work. The work on plant diseases is covered in the report of the Department of Plant Pathology, given under the Adams fund. The reports on the other two projects follow. Since the work on boll weevils and internal parasites of livestock is under the Entomological Department, the full report of that Department is included here.

DEPARTMENT OF ENTOMOLOGY

W. E. Hinds, Entomologist

Herbert Spencer, Assistant Entomologist

STAFF

During the year 1926, five-ninths (5/9) of the time of the Entomologist has been devoted to the Experiment Station work. Assistant Entomologist, Dr. Herbert Spencer, has given full time to the work. Beginning June 1, 1926, Miss Nathalie Poirrier became Secretary to the Entomologist, devoting one-half of her time to Experiment Station work and the balance to Extension work. On July 15, 1926, Mr. B. A. Osterberger was appointed Assistant Entomologist with full time on sugar cane pest work. On November 15, 1926, Mr. Chas. L. Stracener was added to the Staff as Assistant Entomologist with full time on sugar cane work.

In addition to the foregoing, the Department has utilized the part-time service of a considerable number of students during the rush of the sugar cane borer season. The service of these men has been invaluable in the prosecution of our investigations.

PROJECTS

Three major projects have been under way during this season:

1. Sugar cane borer control, and a study of the soil-inhabiting animals attacking the roots of sugar cane.
2. The control of the Mexican cotton boll weevil.
3. Cattle parasite investigations.

On account of the emergency nature of the sugar cane problem, it was decided early in the season that this project should receive primary attention and that, therefore, the major part of funds available and the time for workers should be devoted thereto.

SUGAR CANE BORER

The sugar cane borer is estimated by competent authorities to have destroyed 33% of the 1925 crop. This is the most serious damage ever sustained, but the average damage through a series of years preceding has been reported as approximately 20%. Even in seasons of exceptionally light infestation a loss of 10% is common.

The condition of the sugar industry is so precarious that every effort possible has been considered advisable in seeking to discover practicable means of reducing the damage from insect enemies. Consequently, this project has received nearly exclusive attention during the past season.

Cane borer investigations were started by the writers in the fall of 1925. Observations upon hibernation were continued through the winter and living borers could be found quite commonly in the larval stage hibernating in the scattered canes and thicker parts of the tops lying on the surface of the ground. The burning-off of trash had not destroyed nearly all of the larvae in the tops, and it would appear that the practice of burning trash does not in itself have any great importance in the problem of borer control. Whether the burning of trash is particularly significant in its effects upon the hibernation of the borer egg parasites (Trichogramma minutum) requires much further investigation. Undoubtedly this practice demands consideration from the agricultural standpoint.

The emergence of moths from the cane began after the middle of April apparently in all sections of the cane growing area. The first eggs appeared to have been laid about April 20 in the southern section and about April 30 in the vicinity of Baton Rouge. The first work of young borers was found on early planted corn and continued observations showed that the major part of the borers for both first and second generations are produced in corn, if corn is available. In the early part of the season, the principal sign of borer work on cane is the occasional "dead heart." On corn, the work of the young borers is much more easily found and appears in the form of very small perforations through the younger leaves especially. Typically some of these perforations are arranged in a series of four or five holes in a straight line across the blade of the leaf. This is due to the boring of the first stage larvae through the very tender leaf roll, and the holes are then spread out as the leaf unrolls. It is evident that corn is a more favorable host plant for the borers in early summer and that a larger percentage of the eggs laid on corn produce adult moths than is the case with cane. However, if no corn is grown, the moths simply lay all of their eggs on the cane and a higher infestation in the cane field is the result during the early part of the season.

In some garden patches of corn, the corn stalks were completely killed in many hills by the extremely heavy attack of the borers during the development of the first generation. As many as nineteen (19) pupae were taken from a single stalk of garden corn. The infestation in field corn is usually less concentrated than this. It has been found that over 90% of the borers in a field of corn may be removed by cutting out usually not more than 15% to 20% of the corn stalks. This infested corn may be fed out green to farm animals, or otherwise disposed of, so as to prevent the emergence of moths therefrom. It is evident that whatever corn is present may be utilized in this way for reducing the borer multiplication in the first two generations, and it appears probable also that the deliberate planting of trap plats or rows of corn may prove to be an advisable and effective plantation practice for reducing the subsequent borer attack upon cane. This idea has already met with the approval of many planters and was applied to some extent in June, 1926.

The use of trap lights for capturing borer moths has been tested by many heretofore with unfavorable or entirely negative results. On the contrary, our own trap light tests conducted with incandescent lanterns principally has proven that many moths may be captured in this way. It has been found that the attractiveness of the light varies largely with its brilliancy. Ordinary kerosene lanterns were ineffective. The highest catch of cane borer moths at a single gasoline lantern was about one hundred and fifty (150) during a night. In many cases, no borer moths were secured because at that particular time the moths might not have been flying, although other species may have been very numerous. It is doubtful on the whole whether the number of moths destroyed through the use of trap lights was sufficient to render the practice advisable.

The borer attack on cane increases very rapidly with the maturity of the second generation moths which occurs at the time that the main crop of corn also matures. Thereafter, the principal host plant is cane, and the infestation therein rises rapidly. This happens usually about the last of July or first of August.

The egg parasite (Trichogramma minutum) is the principal natural enemy of the cane borer. It was found in 1926 that this egg parasite was breeding commonly during the early part of the summer in the eggs of the corn ear worm (Chloridea obsoleta) and in the eggs of the tomato sphinx moth (Deilephila lineata). In the comparatively large eggs of the latter species an examination showed that more than 77% of the eggs were parasitized and these produced an average of over twenty (20) parasites per egg. It was surprising that not a single parasitized borer egg was found on either corn or cane until August 11 of the past season. Thereafter, as the borer infestation on cane increased, the parasite attack on borer eggs increased rapidly also. Numerous observations have indicated that the applications of sodium fluosilicate, as made for borer control, do not affect the parasites or prevent their emergence later from these parasitized eggs. Any control effect of the poison on the borers should, therefore, operate to increase the percentage of control resulting from the work of these egg parasites.

Life history observations have shown that five (5) generations developed during the season of 1926, the fifth generation larvae entering hibernation.

Insecticidal control work has been carried on on both corn and cane. Corn foliage has been found to be considerably more tender than cane and more susceptible to burning from poison applications. The principal poison used has been sodium fluosilicate (also called sodium silico-fluoride). Chemical analysis of these various materials have been made through cooperation with A. P. Kerr, chemist of the Experiment Station. It appears that the toxicity of these materials to the cane borer, and in general to corn and cane foliage as well, is in direct proportion to the percentage of the total fluorine content that is water soluble. There is evident need for a very careful and complete study of these chemical materials in both their chemical and physical properties. At present a wide variation exists in the properties of various materials sold under this name.

The applications of sodium fluosilicate to corn were made with hand dust guns and at the rate of approximately ten (10) pounds per acre. In a number of these tests from 50% to 75% of the borer larvae of all sizes, and even some of the pupae, were killed by these applications. It appears that this material acts both as a contact and a stomach poison. It is very encouraging to record that it is possible with any such material to kill even one-half (1/2) of the full-grown borer larvae in their burrows in the basal portion of the dusted stalks.

During the season a very large amount of work was devoted to recording the conditions of borer infestation as they existed in various parts of the cane belt. These records will furnish valuable information for comparison with future observations. In a very large majority of the fields examined before the middle of August, less than 20% of the stalks showed any sign of borer attack, and in many localities the records showed less than 5% of infested stalks.

These infestation records were necessary also as a basis for determining the most satisfactory location for the airplane dusting work contemplated. The most favorable location found up to August 20 was at Southdown Plantation, Houma, and the owners expressed their willingness to cooperate in a large-scale dusting experiment which might cover more than one thousand (1,000) acres of cane. Arrangements for this were practically completed when the severe Gulf storm of August 25 occurred. This storm changed the situation so greatly that it was necessary to examine again representative fields throughout the cane area for borer conditions and cane conditions before making final plans for the airplane work. The borer received a perceptible check as a result of the storm. Apparently most of the adults then active as well as most of the eggs and the larvae in first and second stages were destroyed during the storm, but larvae and pupae in the bases of the stalks were not affected. Therefore, moths emerged very soon after the storm was over and fresh eggs were found within two (2) days. From these eggs young stages appeared in due time.

Final arrangements for the airplane dusting work could be made only late in September. The plans then included an application to the cane growing at the Louisiana Sugar Experiment Station at Baton Rouge and a cooperative arrangement was entered into with A. Wilbert Sons & Company of Plaquemine whereby they bore the expense required for poison used in treating twelve hundred (1200) or more acres of cane. The expense for the airplane service in applying this material was shared between the Louisiana Experiment Station and the Huff Daland Dusters, Inc., which concern did the dusting work for us. Our appreciation is due to both of these parties for their generous cooperation in this initial, large-scale airplane work.

The airplane dusting was begun at Baton Rouge on September 25, and the final applications were made at Plaquemine on October 20. During this series of tests some twenty-six (26) distinct tests were conducted covering practically thirteen hundred (1300) acres of cane and using about ten (10) tons of dust. In most of the work the dust swath spread quite satisfactorily over about one hundred (100) feet width. Most of the applications were made at the rate of from fifteen (15) to twenty (20) pounds of dust per acre. The number of acres treated per minute depends very largely upon the size of the fields and the relative proportion of time spent in actual discharge of the dust as compared with the time lost in turning between swaths. Under the most favorable conditions an actual coverage of twenty-five (25) acres in less than two (2) minutes was secured. The actual cost involved in such experimental work does not provide an adequate basis for determining a fair schedule of costs for future commercial work.

Following these airplane dusting applications, a very large amount of work was necessary to determine the results. A certain amount of leaf-burning was expected and was experienced with most of the materials used. However, this was not of any importance except with one of the new varieties of cane grown on a small area at the Experiment Station. In this case, the leaf-burning was quite extensive and caused a perceptible checking in the growth of the plants, although growth continued to the end of the season. No damage whatever to the cane eyes was noted except with this one exceptionally tender variety. Here the damage was less than 1% while the cane borer larvae were causing an even higher percentage of damage at the same time.

The records showing the general effect of this one application were taken principally at from four (4) to six (6) days after the dust was applied to determine the effect upon the mortality of the borers. Under what may be considered "standard conditions", it appeared that the application destroyed more than 40% of all sizes of borer larvae within from five (5) to eight (8) days, and there is evidence of a continuing toxic effect for more than two (2) weeks. Therefore, the records as secured represent only a partial picture of the actual killing achieved. The smaller stages dried up and disappeared after five (5) or six (6) days, while larger larvae killed in their burrows would decompose and often become unrecognizable. Therefore, the percentages recorded in our tables must be considered as very conservative and, in fact, considerably less than the actual killing that occurred.

A second result from the dusting work could be measured in a comparison of the percentage of canes showing any borer attack and more accurately in the percentage of joints attacked in dusted areas as compared with similar cane, undusted. A third basis for comparison was found in the number of living borer stages per one hundred (100) canes examined. Naturally, such records as these had increasing value after time enough had elapsed for the development of the next generation of borers. Thus, the records taken from four (4) to six (6) weeks after the close of the dusting period became the final records for the season. The taking of these records continued until about the 20th of December. They required the careful cutting up and thorough examination of the entire canes from butt to leaf roll. The records secured are, voluminous and therefore we believe dependable.

A brief summary statement of some of the significant points is shown in the following table.

RESULTS OF AIRPLANE DUSTING WITH SODIUM FLUOSILICATE

Variety	Treatment	No. Canes	Infestation % Joints	Infestation % Canes	Borers per 100 Canes
Purple	Dusted	799	12.63	78.9	45.5
Purple	Check	597	23.79	95.1	78.2
Striped	Dusted	593	10.2	70.1	36.9
Striped	Check	197	27.4	98.0	66.0
D-74	Dusted	682	13.2	63.1	38.6
D-74	Check	200	28.7	91.5	76.5
D-95	Dusted	190	13.3	70.0	60.0
D-95	Check	200	32.6	98.4	75.0
Totals	Dusted	2264	12.08	70.84	41.2
Totals	Check	1194	30.13	95.78	80.1

Even a casual examination of the foregoing table shows clearly that there is a distinct and consistent difference in the infestation conditions following a single dust application. Probably the most significant figure is found in the column showing the percentage of infested joints. It will be seen that this figure is only two-fifths (2/5) as great in the dusted areas as in the undusted in an average of all varieties. The actual number of borer stages found is practically one-half (1/2) as many in the dusted as in the undusted cane. The numbers upon which these records are based are satisfactorily large, the general trend of the results is surprisingly uniform and consistent, and the three methods used in measuring the results agree substantially in their indications. Therefore, we believe that the conclusion is justified that even a single application of sodium fluosilicate applied properly and at a time when the borer infestation may justify it is quite certain to result in a substantial reduction of subsequent infestation and a very plain saving in the cane crop. This work resulted also in giving exceptionally clean, seed cane.

SUGAR CANE ROOT PESTS

In all sugar growing countries it has been found that there are a number of soil-infesting insects and other forms of animal life, particularly snails, which may attack sugar cane roots. The damage done by such animals has never been studied very fully in the United States, although reference has been made to them by a number of investigators and the work of snails, especially, has been described by Rands (*) of the U. S. Sugar-Plant Investigations.

The principal one of these animals causing complaint in Louisiana is a small snail (**Zonitoides arboreus** Say), which is known to occur, widely distributed in the United States. The species has been found feeding on sugar cane roots, and is believed by some growers to be a serious factor in causing a restricted growth of the root system of some varieties of cane and of promoting the spread of various fungus diseases which are serious factors in cane production particularly in the oldest cane-growing areas.

Considerable attention has been devoted to a study of the snails particularly during the latter part of this season. Arrangements are now under way for extending these observations through the winter period under greenhouse conditions where the various animal species may be isolated in soil which has been previously sterilized and where their work may be observed specifically upon the fresh roots of recently planted cane. In this way, we hope that more definite information may be secured as to the nature of the feeding work done by each of these species and that we may be able to decide more positively as to the seriousness of the attack by each species and whether they are important agencies in the spread of pathogenic root diseases.

BOLL WEEVIL CONTROL

The principal subject of investigation continued with the boll weevil has been Hibernation Tests. In the fall of 1925, 13, 295 weevils were placed in a number of hibernation cages on Experiment Station grounds. The emer-

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(*) R. D. Rands, U. S. D. A. Dept. Cir. 366, 1926
"Root Disease of Sugar Cane in Louisiana"

gence of weevils from these cages began on February 16, 1926 and continued until June 12. During this period there occurred an emergence of 5.87% of the total number of weevils started. The crest of the emergence movement in 1926 did not occur until after the middle of May. Apparently the exceptionally cool, late spring of 1926 was responsible for this slow emergence in hibernation.

During October, 1926, an effort was made to secure weevils for another series of hibernation cages. It was found, however, that weevils were then extremely hard to get in the vicinity of Baton Rouge on account of the stripping of cotton by the cotton leaf worms which had occurred during September particularly. Therefore, only two (2) cages could be started and these included a total of only 816 weevils. Our emergence data in the spring of 1927 will be unusually limited at this Station.

No experimental poisoning work for weevil control was undertaken in 1926, but arrangements were made for the general dusting of Experiment Station cotton without reserving any areas for undusted check plats.

An experiment on the effect of various spacing distances upon the size and type of growth of cotton on river bottom soil on the Sugar Experiment Station grounds was undertaken in the hope that some definite information might result which would explain a very remarkable variation in cotton yields occurring in 1924 and 1925 on this same type of soil. In 1924, with a very dry season, a yield of more than 1600 pounds of seed cotton per acre was secured. In 1925, with the same variety of seed planted on an adjacent plat where a heavy growth of corn and cowpeas had been produced in 1924, and with a rainfall during June, July and August of 14.48 inches as compared with only 7.15 inches the preceding year, the cotton stalks made a remarkable vegetative growth, bloomed profusely and then shed practically its entire crop as small bolls. No cotton was picked here in 1926.

In the Cotton Spacing Tests on this bottom land, seed of Lone Star No. 65 was planted on June 26. The spacing varied from unthinned (the stand being left as it grew from the planting) to a maximun of one (1) stalk per hill at approximately twenty-four (24) inches apart. The rows were spaced at an average of 3.7 feet apart. In this test no attempt was made to secure yield records beyond the counting of full-grown bolls about the first of October, at which time the work was closed and the cotton stalks plowed out to prepare for other fall planting.

Measurements of the height of plants, counts of the number of bolls per 100 row-feet and photographic records of typical plants found in each spacing were made. These records showed plainly that under the conditions of this test the widest-spaced plants were lowest in growth, but much more broad and heavily branched than close-spaced plants. Plants grown three (3) in a hill at a distance of twelve (12) inches apart grew to the maximum height and also produced the highest number of full-grown bolls per 100 row-feet. The unthinned cotton was intermediate in height with a very large proportion of dwarfed and fruitless stalks and with less than half the mature bolls to be found on the intermediate-spaced plants.

CATTLE PARASITE INVESTIGATIONS

This project was initiated October 1, 1925 under the immediate direction of Dr. Herbert Spencer. It was deemed advisable to discontinue this work temporarily after July 1, 1926 in order that Dr. Spencer might devote full-time to the more immediately urgent sugar cane borer investigations. In the short time that the project was under way, through routine examinations at the local Abattoir and by laboratory methods a satisfactory method was worked out for locating infested animals and for isolating specimens of the parasites in their various stages in much the same manner that is used in detecting human hookworm infestations. The primary object was to determine the parasites present, the species and stage identifications, and practicable methods of detecting, isolating and preserving such material. Typical specimens were then preserved for laboratory examinations. The status of this work is such that it can be resumed at any time without loss of headway.

SUGAR CANE EXTENSION and EXPERIMENT STATION WORK

for

PERIOD of July 1st., to December 31st., 1926

C. B. Gouaux, Cane Specialist.

H. J. Rodriguez, Asst. Cane Specialist.

This division was established July 1st, 1926, under the special appropriation of the Legislature for securing and disseminating information on sugar cane problems.

Sugar Cane Extension Work

The main purpose of Sugar Cane Extension work, which is performed through the organization of specialists and County Agents, is to conduct practical field sugar cane demonstrations, involving modern agricultural methods based on successful Experiment Station results; assist in the solving of existing serious problems; disseminate beneficial sugar cane information; and assist in working out a profitable system of sugar cane agriculture.

The sugar planters of Louisiana are primarily interested in the successful production of sugar cane. This means producing profitable sugar and tonnage yields, and the realization of net profits on the acres in cultivation. Our sugar industry for a number of years has been very unprofitable. This condition has been occasioned by a combination of adverse circumstances, such as, serious damages from MOSAIC disease, ROOT ROT COMPLEX and RED ROT cane diseases, CANE BORERS, deterioration of the standard varieties, poor system of agriculture and unfavorable weather conditions. As a result many plantations that were at one time prosperous, have been entirely lost by the original owners, remained completely idle or have become heavily mortgaged or otherwise indebted. Unless the sugar business can be placed on a better basis, it will not be many years before it will be entirely lost as an industry in this state.

The Extension and Experiment Station workers are undivided in the opinion that in what is known as the cane territory of the state, sugar cane should continue to be the main money crop. They are exerting every effort towards solving the existing serious problems, and the reestablishment of the sugar industry. The following is an enumeration of the lines of work they are stressing in, based on Experiment Station results, the sugar parishes, through the work of the County Agents, and the cane specialist.

1. Utilization of new varieties;
2. Seed Cane Selection work;
3. Cane Borer Control;
4. Root rot complex control;
5. Land Preparation; involving deep plowing, good seed bed, good drainage, and the incorporation of summer legumes, preferably soy beans, in the land;
6. Melilotus indica, as a winter cover crop;

7. Fertilizer Demonstrations;
8. Cultivation Demonstrations;
9. Diversified Cane Farming.

SUGAR CANE VARIETIES

In all of the sugar parishes with County Agent representatives, the specialist was actively engaged in the fall distribution of the newly released varieties: POJ 36, 213 and 234. The agents cooperated with both the Experiment Station and the American Sugar Cane League in the distribution of these canes, and recommended the cooperating cane growers.

In some of the parishes, field inspection trips with cane growers were made to observe and compare plantings of the new cane varieties with the standard canes.

The planting on a field scale of the newly released varieties: POJ 234, 213 and 36, was especially stressed for the sections of the sugar belt, which showed the greatest amount of deterioration of the standard varieties, occasioned by the mosaic and root rot complex diseases.

Seed Selection Work

This important line of work was especially stressed in the northern and western parishes, where the Louisiana Purple and Striped canes made a fair showing. Field demonstrations were made, and a large number of cane growers were given instructions in the proper method of seed selection.

Seed selection demonstrations were performed with the following County Agents: E. S. Landry, St. Mary; C. C. Chapman, Ascension; G. C. Smith, East Baton Rouge; M. J. Voorhies, St. Martin; F. A. Swann, Avoyelles and F. M. Bacque, Lafayette. A total of fifty seed selection demonstrations is being conducted.

Root Rot Complex Control

A series of ten experiments, using Cyanamid as a repellant to fungi, soil animals and insects, has been started, with the cooperation of the American Cyanamid Company, in the following parishes:

Iberville 2, Vermilion 1, Lafayette 1, Terrebonne 1, West Baton Rouge 1, St. Mary 2 and Lafourche 1.

Fertilizer Demonstrations

Arrangements were made to conduct 27 fertilizer demonstrations, with the new cane varieties, using nitrate of soda and acid phosphate mixtures. This work is in cooperation with the Educational Bureau of Nitrate Agencies, and to be supervised by County Agents, without obligation to any commercial firm or person.

Diversified Cane Farming

The Extension service is devoting a good deal of attention to diversified cane farming, and good results are being obtained in some of the sugar parishes. The following crops are being used in the diversification program:

Cotton, rice truck crops, sweet potatoes, legumes and livestock.

Where diversified cane farming is being practiced in the sugar belt, the lands are in better shape, the growers are in better financial condition and better yields of cane are produced. This system of farming is practiced extensively in the western parishes, and for the past few in the alluvial sections.

Cane Borer Control Work

Although the cane crop of 1926 was only slightly damaged by the serious cane borer pest, the planters are vitally interested in control measures for the cane borer. The method of spring control advocated by Dr. Hinds, is considered a good practical method by the sugar planters, and a step forward towards minimizing borer numbers. The Extension service rendered valuable assistance in demonstrating the method in the spring of 1926, and are planning another active campaign against the cane borers during the spring of 1927.

1926 Cane Situation

The 1926 sugar season in Louisiana was one of the shortest on record and showed the lowest production in a period of over fifty years. In the river and bayou parishes, where the D-74 variety is grown more extensively, the poorest yields were made, while the western and northern parishes, where the Louisiana Purple and Striped varieties are grown, produced a better crop. The new POJ 234 variety was planted mostly in small amounts throughout the sugar belt. In all of the localities, where observed during the season, it was much more advanced in growth than the D-74, and in most cases further advanced in growth than the Louisiana Purple and Striped. Under the existing circumstances, the POJ 234 stands out as a very promising variety of cane, and is worthy of being extended on field scale.

During the fall season, the other two released varieties, POJ 36 and 213, were planted in small and large acreages throughout the sugar parishes. This gives three new sugar cane varieties, which will be further extended over most of the sugar area for the 1928 crop. The Experiment Station and U. S. Sugar Station have a number of other very promising varieties, which are being tested out on the Test Fields in the state, and if they prove out well, will be released and distributed.

There is a widespread interest among the sugar planters for establishing and propagating new and better varieties, which is a good thing, but on the other hand there is not enough interest manifested in securing a system of sugar cane agriculture, which will prevent a repetition, of the present disastrous situation. The program of work of the Extension service, based on the successful results of the Experiment Station, offers the best means of establishing the sugar industry on a safe, successful and profitable basis in Louisiana.

(Note by Director: Since this work is new, and there is much interest in all data on new canes, a much fuller report was requested than is given in older lines of work where detailed data are reserved for repetition and finally for publication in bulletin form.)

During the month of September, the six Experiment Station Test Fields, were placed under my supervision, with H. J. Rodriguez, as assistant in the work.

The Test Fields and their locations are as follows:

1. Angola. West Feliciana parish.
2. Reserve. St. John parish.
3. Glenwood. Assumption parish.
*4. Raceland. Lafourche parish.
5. Sterling. St. Mary parish.
6. Youngsville. Lafayette parish.

*At a meeting of the American Sugar Cane League, an arrangement was made by the Experiment Station and the U. S. Sugar Station for the exchange of the Raceland Test Field for Cinclare in West Baton Rouge parish.

Field Inspection Trips

Shortly after taking charge of the work, a tour of inspection of the Test Fields was made with Rodriguez.

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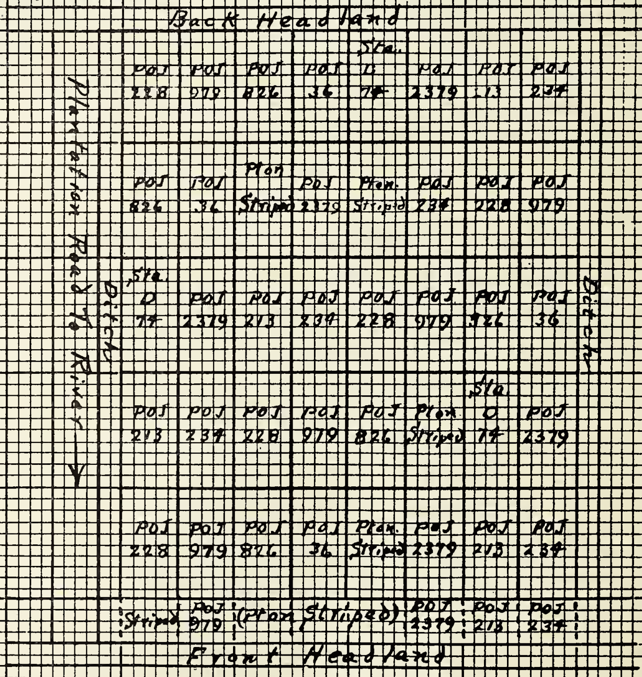
GINCLARE TEST FIELD.

Planted October 26-27, 1926.

Estate Harry L. Laws. Cinclare-Annex Plantation.



POJ 228	POJ 979	POJ 826	POJ 36	Sta. D 74	POJ 2379	POJ 213	POJ 234
POJ 826	POJ 36	Plon Striped	POJ 2379	Plon. Striped	POJ 234	POJ 228	POJ 979
Sta. D 74	POJ 2379	POJ 213	POJ 234	POJ 228	POJ 979	POJ 826	POJ 36
POJ 213	POJ 234	POJ 228	POJ 979	POJ 826	Plon. Striped	Sta. D 74	POJ 2379
POJ 228	POJ 979	POJ 826	POJ 36	Plon. Striped	POJ 2379	POJ 213	POJ 234
Striped	POJ 979	(Plon Striped)			POJ 2379	POJ 213	POJ 234

Size of Plat = 1/20 Acre.
No. Rows = 3.
Width of Rows = 6'.
Length of Rows = 121'.

STERLING TEST FIELD.

Planted November 13, 1926.

Sterling Sugars Inc. West Belleview Plantation.

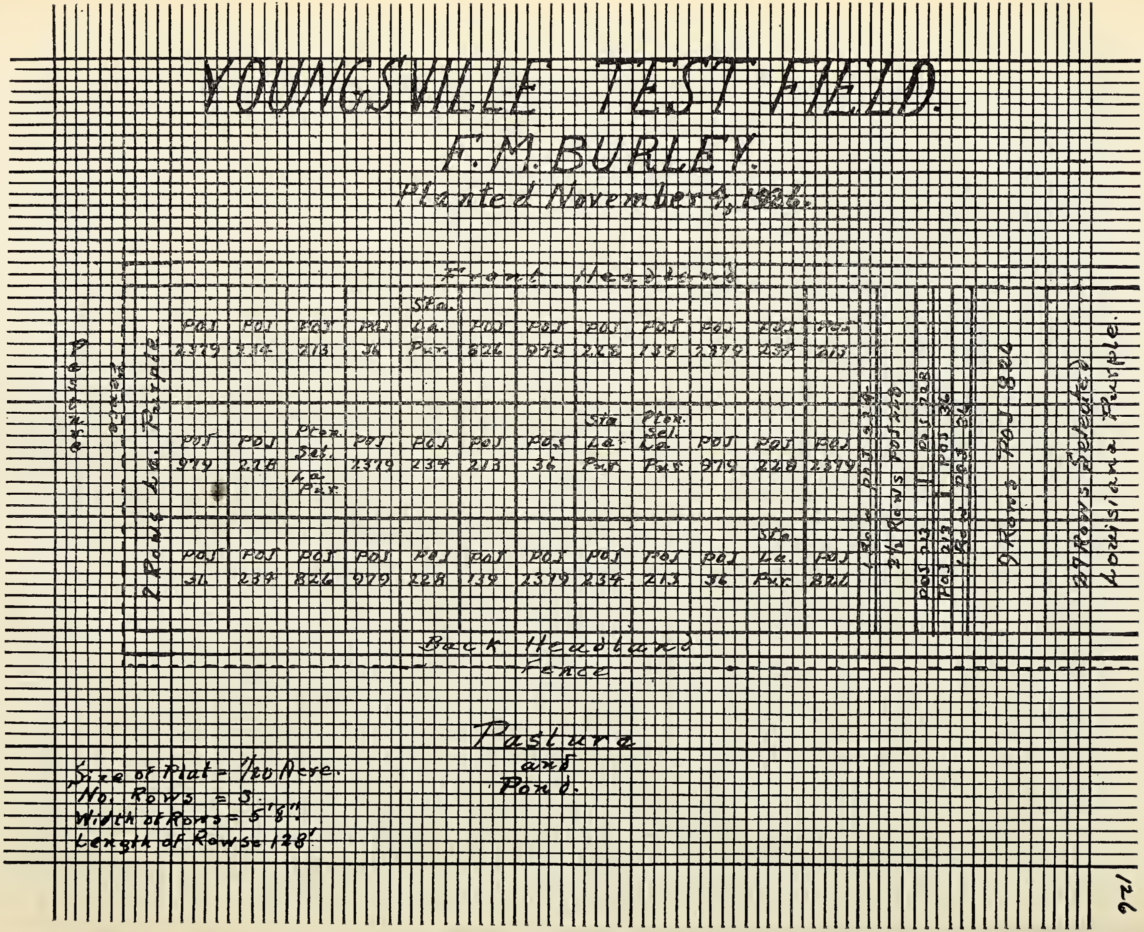
Back Headland

		POJ 213	POJ 234	POJ 228	POJ 979	POJ 826	POJ 36	La. Pur.	POJ 2379		
Field Planting POJ 36	2 Rows Unplanted	POJ 213	POJ 234	POJ 228	POJ 979	POJ 826	POJ 36	Pton. La. Pur.	POJ 2379	2 Rows POJ 213	Ditch
		POJ 2379	POJ 2379	POJ 213	POJ 234	POJ 228	POJ 979	POJ 826	POJ 36		
		POJ 826	POJ 36	Pton. La. Pur.	POJ 2379	POJ 213	POJ 234	POJ 228	POJ 979		
		POJ 228	POJ 979	POJ 826	POJ 36	Pton. La. Pur.	POJ 2379	POJ 213	POJ 234		

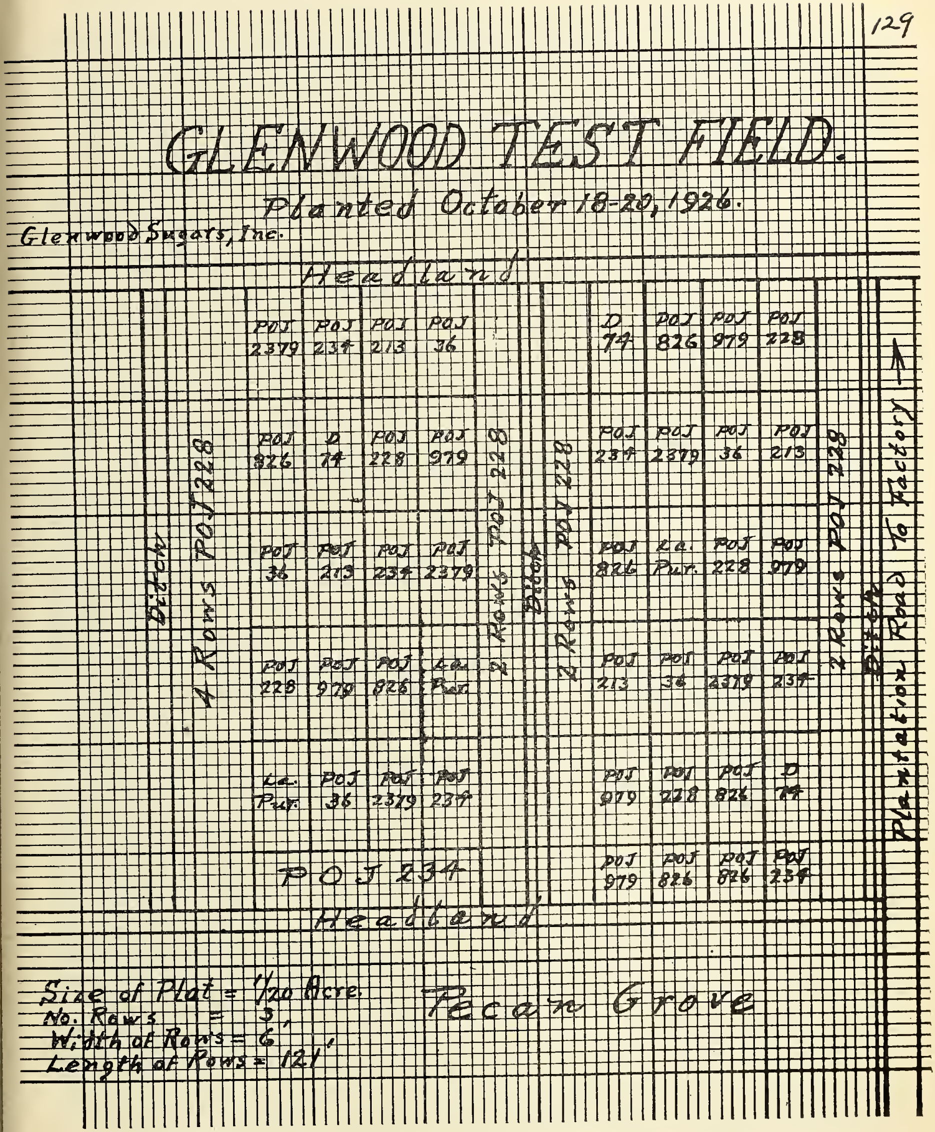
Front Headland

Gravel Road To Sterling →

Size of Plot = 1/20 Acre.
No. Rows = 3.
Width of Rows = 6'.
Length of Rows = 121'.



POJ 2379	POJ 234	POJ 213	POJ 36	Sta. La. Pur.	POJ 826	POJ 979	POJ 228	POJ 139	POJ 2379	POJ 234	POJ 213
POJ 979	POJ 228	Pten. Sel. La. Pur.	POJ 2379	POJ 234	POJ 213	POJ 36	Sta. La. Pur.	Pten. Sel. La. Pur.	POJ 979	POJ 228	POJ 2379
POJ 36	POJ 234	POJ 826	POJ 979	POJ 228	POJ 139	POJ 2379	POJ 234	POJ 213	POJ 36	Sta. La. Pur.	POJ 826



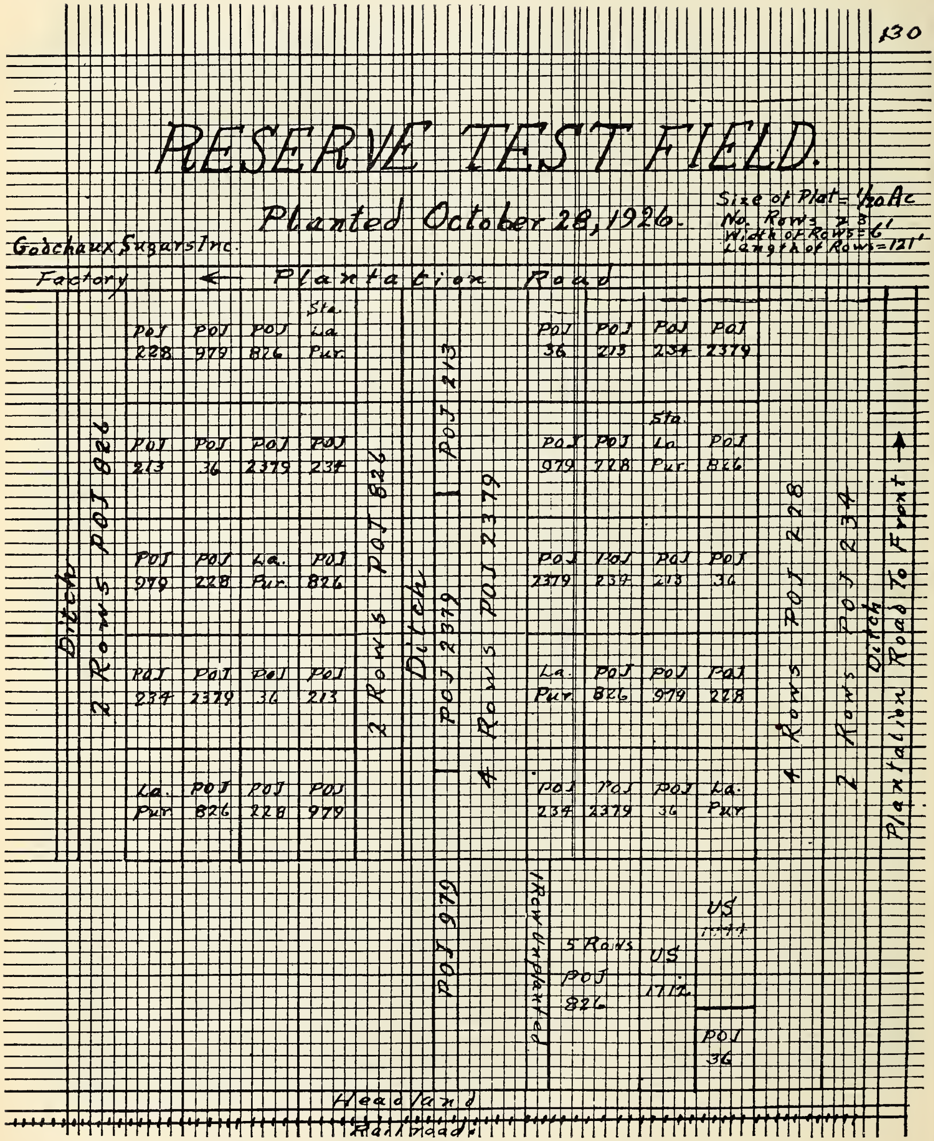
GLENWOOD TEST FIELD.

Planted October 18-20, 1926.

POJ 2379	POJ 234	POJ 213	POJ 36
POJ 826	D 74	POJ 228	POJ 979
POJ 36	POJ 213	POJ 234	POJ 2379
POJ 228	POJ 979	POJ 826	La. Pur.
La. Pur.	POJ 36	POJ 2379	POJ 234
POJ 234			

D 74	POJ 826	POJ 979	POJ 228
POJ 234	POJ 2379	POJ 36	POJ 213
POJ 826	La. Pur.	POJ 228	POJ 979
POJ 213	POJ 36	POJ 2379	POJ 234
POJ 979	POJ 228	POJ 826	D 74
POJ 979	POJ 826	POJ 826	POJ 234

Size of Plat = 1/20 Acre.
No. Rows = 3,
Width of Rows = 6'
Length of Rows = 121'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RESERVE TEST FIELD.
Planted October 28, 1926.
Size of Plat = 1/20 Ac
No. Rows = 3
Width of Rows = 6'
Length of Rows = 121'
Godchaux Sugars Inc.
Factory
←
Plantation Road
Ditch
2 Rows POJ 826
POJ 228
POJ 979
POJ 826
Sta. La. Pur.
POJ 213
POJ 36
POJ 2379
POJ 234
POJ 979
POJ 228
La. Pur.
POJ 826
POJ 234
POJ 2379
POJ 36
POJ 213
La. Pur.
POJ 826
POJ 228
POJ 979
2 Rows POJ 826
Ditch
POJ 213
POJ 2379
4 Rows POJ 2379
POJ 36
POJ 213
POJ 234
POJ 2379
POJ 979
POJ 228
Sta. La. Pur.
POJ 826
POJ 2379
POJ 234
POJ 213
POJ 36
La. Pur.
POJ 826
POJ 979
POJ 228
POJ 234
POJ 2379
POJ 36
La. Pur.
4 Rows POJ 228
2 Rows POJ 234
Ditch
Plantation Road To Front →
POJ 979
1 Row unplanted
5 Rows POJ 826
US 1712
US 1744
POJ 36
Headland
Railroad

In all of the places there were mixtures of varieties, some varieties incorrectly labeled, and general lack of cultivation and attention. In our regular visits during the season, we have endeavored and succeeded in correcting these undesirable conditions. The Angola and Sterling Test Fields were in the worst condition, and in the latter place no attempt was made to secure data during 1926.

On the field trips the following work was performed:

1. Notes on growth of varieties.
2. Sampling varieties for handmill tests.
3. Supervising and running mill tests of the most promising varieties.
4. Selecting new fields for planting.
5. Measuring and laying out plats.
6. Supervising seed cutting and planting.

Test Field Plantings

At a sugar planters meeting held at Glenwoood planation, Napoleonville, on October 8th., with representatives of the Experiment Station, the U. S. Sugar Station and American Sugar Cane League, a standard plan for testing sugar cane varieties on the Test Fields of the Experiment Station and U. S. Sugar Station was adopted. It was decided to use the following varieties: POJ 36, 213, 228, 234, 826, 979, 2379 and D-74 and Louisiana Purple selected. In addition it was decided to make the plantings in 3 row plats, one-twentieth of an acre in size, checker-board system, with replications of each variety varying from 4 to 10.

The following method for running mill tests of the varieties was adopted:

1. Minimun of 4 tons to be used in test, without maceration.
2. In Crusher Juice: determine Brix, Sucrose and Purity.
3. In Mixed Juice: determine Brix, Sucrose, and Purity.

4. In Residual Juice: determine Brix, Sucrose, Purity and Glucose.

5. In Bagasse: determine Sucrose, Moisture and Fiber. Handmill tests to be run at regular intervals, starting in October and extending throughout the grinding season.

Handmill Tests

During the months of October and November, representative samples of cane (3 to 5 stalks), of the Test Field varieties, both plant and stubble cane, were taken, and handmill tests made. On the following Test Fields: Angola, Reserve, Raceland, Glenwood and Youngsville, from two to three series of handmill tests were performed.

Fall Plantings of Test Fields

The fall plantings were made on the following Test Fields, according to the new plan adopted: Glenwood, Reserve, Cinclare, Sterling and Youngsville. The sketches, contained in this report give the details of planting layout of each Test Field.

Mill Tests

In order to obtain information on the milling qualities of some of the new and most promising varieties, two series of mill tests were conducted. The first series was conducted at Glenwood, from plant cane Test Field varieties, on November 22nd. The second series of mill tests was conducted at Reserve, from plant cane Test Field varieties, on November 27th. Copies of the results of these mill tests are attached to this report.

FIELD INSPECTION OBSERVATIONS

Test Field	Most Outstanding Varieties.
Glenwood.	POJ 234, 36, 228, 826, 2379, (979 badly storm damaged)

	US 1444 and 1436.
Reserve	POJ 234, 213, 228, 826, 2379 and (979 badly storm damaged) US 1444 and 1712.
Raceland.	POJ 234, 213, 228, 826, 2379 and (979 badly storm damaged) US 1444 and 1712.
Youngsville.	POJ 213, 228, 826, 36. 234, 139 and 979 (slightly storm damaged.)

TIME REPORT

Days in Field 106. Days in office 43

Days Annual Leave 5. Total Mileage traveled 6248

RESERVE TEST FIELD
MILL TESTS OF SUGAR CANE VARIETIES

Godchaux Sugars Inc., Reserve, La. Nov. 27, 1926

Variety	Juice	Brix.	Sucrose	Purity	Glu-cose	Acidity
POJ 234	Crusher	15.57	12.27	78.81	1.3	1.1
POJ 234	Mixed	14.63	11.03	75.39	1.6.	1.4
POJ 234	Residual	13.69	9.45	69.03	1.6	1.9
POJ 228	Crusher	14.47	10.37	71.66	1.4	0.9
POJ 228	Mixed	14.32	10.10	70.53	1.6	1.2
POJ 228	Residual	13.99	9.19	65.69	1.7	2.3
POJ 213	Crusher	15.69	11.27	71.83	1.8	0.9
POJ 213	Mixed	15.34	10.18	66.36	1.9	1.2
POJ 213	Residual	15.09	9.12	60.44	2.3	1.9
La. Purple	Crusher	14.63	10.97	74.98	1.5	0.6
La. Purple	Mixed	14.43	10.54	73.04	1.6	0.9
La. Purple	Residual	14.34	9.76	68.06	1.7	1.6

BAGASSE ANALYSIS

Variety	% Bagasse	Sucrose	Moisture	% Fiber In Cane
POJ—234	30.89	3.84	48.5	14.19
POJ—228	27.97	3.70	48.0	12.97
POJ—213	34.05	3.70	47.0	15.96
La. Purple	26.70	3.98	48.8	12.11

AVAILABLE SUCROSE YIELDS

Variety	Wt. Cane Pounds	Wt. Juice Pounds	Wt. Juice Per Ton Pounds	N. Extr.	Avail. Suc. Per Ton	Avail. Suc. Per Acre
POJ—234	5940	4105	1382.15	69.11	129.9	2143
POJ—228	9440	6800	1440.68	72.03	118.76	2002.3
POJ—213	3980	2625	1319.09	65.96	104.9	1490.6
La. Purple	8520	6245	1465.96	73.3	129.07	1409.4

RESERVE TEST FIELD. (Continued).
MILL TESTS OF SUGAR CANE VARIETIES.

Godchaux Sugars Inc., Reserve, La. November 27, 1926

CALCULATED ACRE YIELDS

Variety	Tons Cane Per Acre
POJ 234	16.50
POJ 228	16.86
POJ 213	14.21
La. Purple	10.92

Some of the canes in this plat had been removed.

Note: Sucrose calculated on extraction shown by each variety, and B. H. E. of 98, using Java formula. No maceration used on mills. Fiber determined by calculation.

These mill tests were conducted under the supervision of Mr. J. P. Grevens, Manager Reserve Factory and Mr. F. J. Gayle, Chief Chemist, Reserve Factory.

GLENWOOD MILL TEST

November 22, 1926

Variety	Juice	Brix	Sucrose	Purity
POJ 228 —	Crusher	13.96	10.03	71.8
POJ 228 —	Mixed	13.47	9.34	69.6
POJ 228 —	Residual	13.33	8.51	63.8
POJ 36 —	Crusher	13.25	9.51	71.07
POJ 36 —	Mixed	13.30	9.34	70.02
POJ 234 —	Residual	13.19	8.56	64.90
POJ 234 —	Crusher	14.53	11.58	79.6
POJ 234 —	Mixed	14.59	11.34	77.7
POJ 234 —	Residual	14.63	10.55	72.1
POJ 826 —	Crusher	13.85	9.88	71.3
POJ 826 —	Mixed	13.71	9.47	69.07
POJ 826 —	Residual	13.53	8.65	63.93
POJ 2379 —	Crusher	13.05	8.23	63.06
POJ 2379 —	Mixed	12.87	8.13	63.20
POJ 2379 —	Residual	12.93	7.91	61.20
Cayana 10 —	Crusher	13.05	8.58	65.70
Cayana 10 —	Mixed	13.37	8.57	64.00
Cayana 10 —	Residual	13.42	7.85	58.40
D—74*—	Crusher	13.07	9.70	74.2
D—74*—	Mixed	13.24	9.84	74.3
D—74*—	Residual	12.99	9.08	69.9
Native (Dry)—	Crusher	13.26	9.81	74.1
Native (Dry)—	Mixed	13.07	9.77	74.5
Native (Dry)—	Residual	12.70	9.24	72.80
Native (Wet)—	Crusher	12.83	9.40	73.2
Native (Wet)—	Mixed	12.17	8.94	73.5
Native (Wet)—	Residual	8.63	5.80	67.2
POJ 979*—	Crusher	13.43	9.36	69.6
POJ 979*—	Mixed	13.60	9.34	66.3
POJ 979*—	Residual	14.03	9.62	68.6

* Large percentage of storm broken stalks in cane milled.

GLENWOOD MILL TEST. (Continued)

Variety	Bagasse % Water	% Fiber	Tons Cane In Test	Available Sucrose Per Ton Cane
POJ 228	45.6	49.7	3.85	119.4
POJ 36	52.67	32.48	2.56	119.1
POJ 234	55.8	38.60	3.72	154.1
POJ 826	51.08	44.55	2.68	119.9
POJ 979	60.72	34.52	1.36	110.5
POJ 2379	60.30	35.75	1.66	95.6
Cayana 10	44.74	50.06	4.83	101.7
D-74	55.8	39.05	4.58	131.0
Native				129.7

Note: Bagasse brought to Baton Rouge for analysis, and fermentation set in before sucrose could be determined.

The varieties showed up best from a milling standpoint, in the following order:

1. D-74 and Native.
2. POJ 234.
3. Cayana.
4. POJ 36.
5. POJ 228, 826, 979 and 2379.

(With Entomology)

Projects of Investigations of Insects Affecting Truck Crops in Louisiana, 1926, by

Chas. E. Smith, Assistant Entomologist,
Norman Allen, Junior Entomologist,
of
U. S. Department of Agriculture,
Bureau of Entomology, In Cooperation
with
Louisiana Experiment Stations,
Baton Rouge, Louisiana.

Two species of insects that affect truck crops, namely; the spotted cucumber beetle and the tomato fruitworm constituted the principal projects in 1926. Other insects affecting these crops that receive minor attention were red spiders on strawberries, and belted cucumber beetle, blister beetles, thrips, plant lice and cutworms.

The studies of the spotted cucumber beetle were conducted in both the field and laboratory and consisted of observations on its life history, seasonal abundance, environmental factors affecting the species in various ways, natural enemies, and natural and artificial means of control. Observations to date indicate that there is but one major brood produced per year and the greatest amount of damage done by the adults or beetles is caused by those that are present in the field during the winter and early spring with less amount being caused by the early brood in the spring soon after emerging. Practically all of the larval injury is caused by those present in the field in early spring, the extent and time of which depending largely upon weather conditions, while there are other factors of minor importance. Sodium fluosilicate has shown up favorably in insecticidal tests conducted on the control of the species. Some progress has been made with the use of certain crops planted as traps for the beetles which are designed for use before the egg laying starts for the destructive spring brood of larvae.

The observations on the tomato fruitworm have consisted largely of studies of control measures, both natural and artificial, seasonal habits and food plants. Several dilutions of lead arsenate and calcium arsenate and sodium fluosilicate were tested on tomatoes for the protection of the fruits. Moderately satisfactory results were obtained from the arsenicals, while the sodium fluosilicates were unsatisfactory due to the ineffective controls obtained with the weaker dilutions and the severe injury to the foliage and fruits by the stronger strengths. Several parasites and predators have been found and aid considerably in keeping the species in check. A parasitic fungus, an Emtomophthora, killed a very large percentage of these worms that were in the field during the fall of 1926.A number of different preparations were tested as baits and traps, including lights for catching the moths, all of which gave practically negative results. However, the moths of several species of economic importance were captured in worthwhile numbers, among which several species of cutworm moths were represented.

The observations made on the species receiving the minor attention and mentioned above consisted largely of making notes on field conditions which will be of value when the problems are taken up for a more detailed study.

Fertilizer and Feed Stuffs Laboratory.

For analysing samples of fertilizer and feed stuffs and insecticides collected by the State Department, in the administration of laws on fertilizer feed stuffs and insecticides.

A. P. Kerr, Chief Chemist.
J. H. Jolly, Ass't. Chemist.
J. L. Farr, Ass't Chemist.
W. P. Denson, Ass't Chemist.

This work is supported by funds received from the sale of tags for guaranteeing fertilizer, feed stuffs and insecticides.

The Experiment Station laboratory has made all analyses of feeds, fertilizers and insecticides for the State Department of Agriculture. The laboratory analysed 1057 fertilizer samples and 1075 feed samples the past season. The detailed reports of these analyses are printed in full in bulletin form, and distributed to a large number of farmers and merchants.

There was in addition to the regulatory work, the usual amount of miscellaneous samples of feeds, soils, water etc., for analysis.

The laboratory is called upon from time to time to make soil analysis for farmers of this State. As there are so many outside factors that have to be taken into consideration, an analysis of a soil without any other information means very little, either to the farmer or to the Experiment Station. There is no justification for the popular idea that the soil analysis will clearly indicate what fertilizers may be used to best advantage.

FINANCIAL REPORT OF THE AGRICULTURAL EXPERIMENT STATIONS
LOUISIANA STATE UNIVERSITY
FROM JANUARY 1, 1926, TO DECEMBER 31, 1926

DR.	Hatch Fund	Adams Fund	Purnell Fund	State Fund	Fertilizer Feed Stuffs	Special Sugar Cane
Balance, Jan. 1, 1926	$	$ 763.98	$ 2,674.75	$ 633.19	$	$
U. S. Treasurer	15,000.00	15,000.00	25,000.00			
State Appropriations				40,000.02		14,583.33
Refunds				5,932.76	.40	658.32
Interest on Daily Balance				121.48		
Sales				9,512.95	20.95	
La. Highway Commission					160.00	
Commissioner of Agriculture						
(Less Amount transferred to State Fund)					**28,880.76	
Transferred from Fertilizer Fund				**4,154.80		
Total Receipts	$15,000.00	$15,763.98	$27,674.75	$60.355.20	$29,062.11	$15,241.65
*Loan from Bank				19,531.15		
Total	$15,000.00	$15,763.98	$27,674.75	$79,886.35	$29,062.11	$15,241.65
Overdraft, Dec. 31, 1926	1,898.74			3,787.43		
Total Receipts, Loan and Overdraft	$16,898.74	$15,763.98	$27,674.75	$83,673.78	$29,062.11	$15,241.65

CR.	Hatch Fund	Adams Fund	Purnell Fund	State Fund	Fertilizer Feed Fund	Sugar Cane Fund
Salaries	$ 7,558.25	$11,269.18	$15,803.40	$17,513.91	$18,111.73	$ 5,394.79
Labor	3,802.55	937.90	1,662.73	24,895.49	1,648.73	2,450.92
Stationery & Office Supplies	239.70	70.15	157.52	69.64	241.46	
Scientific Supplies	83.39	79.98	467.70	337.21	1,725.90	24.28
Feed Stuffs	62.12	54.25	7.73	483.68		
Sundry Supplies	150.80	125.28	359.51	1,898.93	138.68	1,353.74
Fertilizer				1,303.48		
Communication Service	77.60	41.00	88.39	394.14	198.73	91.80
Travel Expense	410.58	742.52	1,452.61	2,413.89	187.73	1,411.60
Transportation of Things	57.35	5.91	483.22	896.80	265.57	196.81
Publications	774.26			488.28		
Heat, Light, Water & Power	168.36	5.87	82.30	1,666.27	205.80	
Furniture, Furnishings, Fixt.	29.65	127.15	184.90	900.65	471.13	
Library		108.69	13.77	59.64	37.20	
Scientific Equipment	5.00		712.81	14.81	144.68	4.00
Livestock			953.74	1,992.15		
Tools, Mach. & Equipment	339.67	856.86	1,693.99	3,782.01	73.00	83.73
Buildings and Land	195.04	1,072.86	628.03	5,251.10	337.65	
Contingent Expenses				700.85	53.50	1,484.00
Total Disbursements	$13,954.32	$15,497.60	$24,752.35	$65,062.93	$23,841.49	$12,495.67
Loans Refunded				18,610.85		
Total	$13,954.32	$15,497.60	$24,752.35	$83,673.78	$23,841.49	$12,495.67
Overdrafts, Jan. 1, 1926	2,944.42				367.13	
Total	$16,898.74	$15,497.60	$24,752.35	$83,673.78	$24,208.62	$12,495.67
Balance, Dec. 31, 1926		266.38	2,922.40		4,853.49	2,745.98
Grand Total	$16,898.74	$15,763.98	$27,674.75	$83,673.78	$29,062.11	$15,241.65

*Loans and Overdrafts were in anticipation of monies appropriated and are not expenditures in excess of appropriations. Refunds are not an actual receipt, being mainly money refunded for travel expenses advanced.

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REPORT OF THE AGRICULTURAL EXPERIMENT STATIONS FOR THE YEARS 1928-1929

BY

C. T. DOWELL, Dean and Director

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATIONS

Ramires-Jones Printing Co.
Baton Rouge
1930

AGRICULTURAL EXPERIMENT STATION STAFF

ADMINISTRATION

C. T. Dowell, Ph. D., Director

W. G. Taggart, B. S., Assistant Director

Ruth Heidelberg, Secretary

J. K. McHugh, Librarian

STATE STATION, BATON ROUGE

Agricultural Engineering

H. T. Barr, M. S., Asst. Professor Agricultural Engineering.

Agronomy

H. B. Brown, Ph. D., Head of Research in Soils and Crops.

John P. Gray, M. S., Associate Agronomist.

A. H. Meyer, Ph. D., Associate in Soil Science.

Animal Industry

Chas. I. Bray, Ph. D., Professor Animal Industry.

J. B. Francioni, M. S., Assistant Professor Animal Industry.

M. G. Snell, Ph. D., Assistant Professor Animal Industry.

Animal Pathology

Harry Morris, D. V. M., Associate Professor Animal Pathology.

Bacteriology (Soils)

M. B. Sturgis, M. S., Assistant Professor Research in Soil Bacteriology.

W. P. Denson, B. S., Assistant.

Dairy Husbandry

R. H. Lush, M. S., Professor of Research in Dairy Production.

Entomology

W. E. Hinds, Ph. D., Head of Research in Entomology.

B. A. Osterberger, B. S., Assistant Entomologist.

Herbert Spencer, Ph. D., Associate Professor of Research in Entomology.

C. L. Stracener, Assistant.

Farm Management

R. J. Saville, M. S., Associate Professor Research in Farm Management.

G. B. Reuss, Assistant.

Horticulture

J. C. Miller, Ph. D., Head of Department; Associate Professor Research in Horticulture.

Home Economics

Gertrude Sunderlin, Ph. D., Assistant Professor Research in Home Economics.

Parasitology

R. L. Mayhew, Ph. D., Assistant Professor Research in Parasitology.

Plant Pathology

C. W. Edgerton, Ph. D., Professon Botany and Bacteriology; Head of Research in Plant Pathology.

L. H. Person, M. S., Assistant.

P. J. Mills, M. S., Assistant.

A. G. Plakidas, Ph. D., Asst. Professor Research in Plant Pathology.

E. C. Tims, Ph. D., Associate Professor Research in Plant Pathology.

T. C. Ryker, B. S., Assistant.

Poultry Husbandry

C. W. Upp, M. S., Associate Professor Poultry Husbandry.

W. M. Ginn, M. S., Instructor in Poultry Husbandry.

Sugar Engineering

Wm. Whipple, B. S., Professor Steam Engineering.

Sugar Cane

W. G. Taggart, B. S., Assistant Director.

C. B. Gouaux, M. S., Specialist in Charge Outfields.

S. T. Breaux, B. S., Assistant in Outfield Work.

E. C. Simon, B. S., Assistant.

Fertilizer and Feed Control

A. P. Kerr, M. S., Chief Chemist.

J. H. Jolly, B. S., Assistant Chemist.

Jesse L. Farr, M. S., Assistant Chemist.

C. C. Moreland, B. S., Assistant Chemist.

Detailed by United States Department of Agriculture

Apiculture

Warren Whitcomb, Jr., Ph. D., Assistant Apiculturist, Bee Culture Investigations.

E. Oertel, Ph. D., Ass't. Apiculturist.

Cereal Investigations

Hugo Stoneberg, M. S., Specialist in Cereal Investigations, Bureau Plant Industry.

Entomology

C. E. Smith, M. S., Specialist in Truck Crop Insects.

Normal Allen, M. S., Asst. in Truck Crop Insects.

SUB-STATIONS

Cotton Station, St. Joseph, La.	C. B. Haddon, B. S., Supt.
Fruit and Truck Station, Hammond, La.	B. Szymoniak, Supt.
North Louisiana Station, Calhoun, La.	Sidney Stewart, Supt.
Rice Station, Crowley, La.	J. M. Jenkins, Supt.

ANNUAL REPORT OF EXPERIMENT STATIONS

Dr. C. T. Dowell
Director

THE PURPOSE of an agricultural experiment station is to get information in order to be able to answer questions that have come up in regard to farming. Our aim at the Louisiana Experiment Station is to keep in close touch with the farmers of the State through the Extension Division and in other ways so that we may have as much information as is possible for us to obtain about problems that present themselves on various phases of agriculture. We are trying to work out a symmetrical research program so as to not to neglect any of the major agricultural interests of the State. This thought has been constantly in mind for the last year and will be the guiding principle in the work of the Station.

The results given in this report should not all be taken as final. It is our aim to give out results as promptly as possible by means of the annual report and reports of a preliminary nature to the newspapers. What I wish to do here is to give a statement of some of the changes and additions that have been made in the work during the past year and a half.

NEW BUILDINGS

DAIRY BUILDING

The dairy industry has been growing very rapidly during recent years. On this account we were very fortunate in getting a new dairy building last year. While the building is not a large one, yet it is large enough to accommodate the Institution in its teaching and research for a number of years to come. It has added very much to the efficiency of the teaching and research.

DALRYMPLE MEMORIAL

The plan that was drawn for the University for its new campus included a group of buildings for teaching and research in animal pathology. The original plan called for four small buildings; two of these are in process of construction at this time. When these buildings are completed and equipped as planned they will add very much to our teaching and research in animal pathology. These buildings are being named in honor of Dr. W. H. Dalrymple, who was connected for a long time with the Experiment Stations.

BEEF CATTLE FEEDING SHED

The Experiment Station was not provided until this last summer with a building and lots which would enable it to carry on feeding experiments with beef cattle. A shed was put up providing for five lots and a two story part which will enable us to conduct digestion trials with various feeds.

SEED HOUSE

The Department of Agronomy is doing considerable work in the way of testing and breeding seed for field crops. An inexpensive seed house was put up last summer which is a great help in storing different varieties of cotton, corn, etc.

HORTICULTURAL SHED

A new line of work was undertaken by the Experiment Station this last summer. A fairly comprehensive program of investigation of fruits and vegetables has been started. This made it necessary to have some place on the horticultural grounds for the storage of vegetables, fertilizer, machinery, etc. A building suitable for this purpose was completed last summer.

POULTRY BROODER HOUSE

The Department of Poultry has been very much handicapped on account of not having a brooder house. The brooding of chicks had been carried on in small buildings. It was found that these were needed for other purposes and they were not satisfactory for breeding purposes, so a brooder house was constructed last summer. It is provided with a hot water heating system and it has a room at one end for battery broodings. The runways are made of concrete and covered over with screens. This has added very much to the facilities for teaching and research in poultry.

DAIRY BUILDING AT CALHOUN

Interest in dairying in the northern part of the State has increased a great deal during the last few years. For that reason it was decided to put in a small dairy herd at the sub-station at Calhoun. We built a small barn. Equipment has been put in for testing milk and a small electric refrigeration plant has been provided.

OTHER IMPROVEMENTS

The facilities for carrying on research with hogs was not at all adequate so a number of pens has been built this past winter and they have been provided with self-feeders. This will enable us to carry on our work with hogs much more satisfactorily.

A small stock of common sheep was bought this last winter and a small shed was built for them and the pasture fenced in order to keep them.

It has been found that we had great difficulty in keeping our chickens free from disease, so two things have been done looking toward improvement in that respect. Six acres of land was fenced and is known as a growing range. Small portable houses were provided. The chicks will be kept in brooder houses under screens until they are six or eight weeks old and will then be transferred to the growing range. It is our plan to use two acres each year. The other four acres will be under cultivation. Rotation will be practiced so that the land will be in cultivation two years and used as a growing range one year. The other step that has been taken looking towards prevention of diseases of poultry is the putting in of double yards in connection with the long poultry house. The house was built with a yard on the south side only; this past year provision was made for yards on the north side of the house. This will allow a rotation of yards which will tend to keep down diseases.

DELTA EXPERIMENT STATION, ST. JOSEPH

A law was passed at the last regular session of the Legislature providing for the establishment of a sub-station at St. Joseph, which is located in what is known as the Delta section of the State, a section devoted very largely to the production of cotton. The law provides that 160 acres of land should be furnished and that when the University accepted title to the land it was obligated to set aside not less than $10,000 a year for the maintenance of the work at that Station. Title to the land was not secured in time for us to do very much research last year. This year the Experiment Station bought another 25 acres of land to be used by the Delta Station for the purpose of building sites, lots, etc. This 25 acres is on the opposite side of the road from the 160 acres. The residence and quite a few other buildings have been completed at this Station and it is expected that a fairly good program will be under way this year.

Mr. C. B. Haddon, who had been District Agent in the northeastern section of the State, was elected Superintendent of this sub-station.

PROGRAMS FOR THE SUB-STATIONS

Conferences have been held during the year for the purpose of outlining a program for each of the sub-stations. The Superintendents of the sub-stations, representatives of the central staff and representatives of the Extension Division, participated in these conferences. It was thought that by having members of the Extension Division present at these conferences we would become acquainted with the more urgent problems in the district served by each of these sub-stations. What is thought to be adequate programs have been outlined.

NEW LINES OF WORK

It is a well known fact that it is impossible for a central station, representing the entire State, or a sub-station, representing a certain section, to give information in regard to varieties of field crops, fertilizers and rotations that will be applicable to all sections. For that reason what we have called "outfield work" was started last year at nine different places in the State. This work is in cooperation with farmers. The farmer is paid for the extra labor that is required in connection with the work.

The outfields have been located so as to have them on the different soil types. Mr. John Gray was employed to have supervision of this work. He will continue to have charge of it but Mr. John R. Cotton, who was graduated from this Institution this winter, will be in immediate charge of it in the future.

Variety tests of cotton, corn and soybeans are being made. Fertilizer tests for cotton, and in some cases with corn, are being conducted. Fertilizer tests with oats are being made in those sections of the State where oats are being grown. A report has been issued giving results of tests this last year.

AGRICULTURAL ECONOMICS

No one was employed to do work in agricultural economics last year. However, the Experiment Station cooperated with the Federal Government by paying one-half of the salary of two of its employees in connection with a grade, staple and price study of cotton. This cooperation is being continued this year.

The Station financed a project that was carried on by Dr. R. L. Thompson, of the College of Commerce, which had for its purpose a study of the agricultural credit situation in the State. The results of this study have been put in manuscript form and are ready for publication.

Beginning with this year, work was undertaken in farm management. A study is being made of the farms of the rice territory and sugar section and we are cooperating with the Bureau of Agricultural Economics of the United States Department of Agriculture in a study of farm power in the sugar section of the State.

HOME ECONOMICS

Investigations were started last last year in connection with home economics. There are two projects under way;

one of these has for its purpose a study of the anti-rachitic effect of acidophilus milk; the other is a study of the home canning of meat under conditions in Louisiana. Fairly conclusive results have been got on the canning project but the work on the other project has not been in process long enough to arrive at any definite conclusions.

HORTICULTURE

I have already mentioned under the heading of buildings that investigations were started last summer on vegetables and horticultural crops. A fairly comprehensive program with this line of work has been outlined.

DAIRYING

Four or five projects were outlined this year in connection with dairy production. Special attention is being given to a study of pastures. Investigations on pastures are being undertaken both at Baton Rouge and at Calhoun. A study of the production of cows on pasture, with grain and without grain, is being made. The cost of raising heifers is being determined.

PARASITOLOGY

Work in this line was undertaken in the fall of 1928. Dr. R. L. Mayhew, who was connected with the Department of Zoology, was employed for part time during the year 1928-29. Beginning with the year 1929-30 he was employed for full time by the Experiment Station; he has devoted his entire attention this last year to a study of coccidiosis in chickens.

FELLOWSHIPS

During this year three fellowships have been established in connection with the Experiment Station. The Chilean Nitrate Company gave $2,000 for the establishment of a fellowship for carrying on investigations in the use of sodium nitrate as a fertilizer for cotton, corn, and oats. This work is being put under way at four or five different places.

Mr. Frederick A. Mitchell, who was graduated from this Institution in '29, was elected to this fellowship.

The Amtorg Trading Company gave $1,500 to establish a fellowship for the purpose of a study of the control of round worms by the use of Santonin as an anthelmintic. Mr. J. A. Martin, a senior in the College of Agriculture, was elected to this scholarship.

The American Cyanamid Company gave $1,500 for the establishment of a fellowship for the purpose of investigating cyanamid as a fertilizer for sugar cane. Mr. A. K. Smith, who was graduated from this Institution with the class of '29, has been elected to this fellowship.

CHANGES AND ADDITIONS TO STAFF

AGRONOMY

Mr. D. N. Barrow died in December, 1928.

Mr. John Gray, who has a master's degree from Oklahoma A. & M. College, was elected to succeed him. Mr. Barrow had had charge of the work with sugar beets and soy beans. Dr. H. B. Brown took over the work with sugar beets and Mr. John Gray continued the work with soy beans and has supervision of outfield work.

Dr. A. H. Meyer was added to the staff of this department in the summer of 1929. Dr. Meyer took his doctor's degree at the University of Wisconsin, majoring in soils. He has had a great deal of experience in connection with soil survey work in the South and also with soil investigations. He will devote his entire time to soil investigations.

It has already been mentioned that Mr. John R. Cotton is to have charge of the outfield work under the direction of Mr. Gray.

Mr. W. L. Owen, who was in charge of research in soil bacteriology, resigned the first of last October. Mr. M. B. Sturgis, who took his bachelor's degree at Texas A. & M. College and his master's degree at Iowa State College, was elected to succeed Mr. Owen. Mr. Sturgis has done considerable graduate work beyond his master's degree. He will continue the investigations started by Mr. Owen, but will be connected with the Department of Agronomy, so that there may be close contact in the work with soils done by Dr. Meyer and Mr. Sturgis.

AGRICULTURAL ENGINEERING

Mr. Carl Nadler, who had charge of sugar cane engineering, resigned last summer and Mr. Wm. Whipple was elected to succeed him. Mr. Whipple is a graduate of Massachusetts Institute of Technology and has been connected with Cinclare Factory for a number of years.

Mr. C. L. Osterberger resigned last summer and Mr. H. T. Barr of the University of Arkansas was elected to succeed him. Mr. Barr did his under-graduate work at the University of Missouri and took his master's degree at Iowa State College.

ANIMAL HUSBANDRY

Until this past summer Dr. C. I. Bray was the only member of the Experiment Station staff representing animal husbandry. Professor J. B. Francioni and Dr. M. G. Snell had been doing some work but were not officially members of the Experiment Station Staff. Arrangements were made this last summer by which less of Dr. Bray's salary would be paid by the Station and a part of the salaries of Professor Francioni and Dr. Snell would be paid, thus making them members of the Experiment Station Staff.

ENTOMOLOGY

Until this past summer Dr. W. E. Hinds had devoted a part of his time to extension work. At the beginning of this fiscal year Mr. C. O. Hopkins, who was a member of the entomological staff, was made extension entomologist, and Dr. Hinds is now devoting his full time to research in entomology.

DAIRYING

It has already been mentioned that work was started this year in dairying. Mr. R. H. Lush was elected to undertake this work. Mr. Lush is a graduate of Kansas Agricultural College. He took his master's degree at the University of Minnesota and has finished all of his work for the doctor's degree at the University of Wisconsin with the exception of completing his thesis.

FARM MANAGEMENT

I have mentioned that work in agricultural economics was started last year. Included in this is farm management. Mr. R. J. Saville of North Carolina Agricultural College was employed for the purpose of beginning investigations in farm management this past summer. Mr. Saville took his bachelor's degree at the University of Missouri and his master's degree at North Carolina Agricultural College. He has completed all of his work for the doctor's degree at Cornell University with the exception of his thesis.

Mr. G. B. Reuss was employed last fall to undertake farm management studies in connection with sugar cane. Mr. Reuss received his bachelor and master's degrees at the University of Illinois.

HORTICULTURE

Dr. J. C. Miller of Oklahoma A. & M. College, was elected last year to begin work with horticultural crops, particularly with vegetables. Dr. Miller took his doctor's degree at Cornell University. After finishing his work at Cornell he went to Oklahoma A. & M. College, where he remained a year. He was made head of the department of horticulture at this Institution last summer.

PARASITOLOGY

I have already mentioned that Dr. R. L. Mayhew began work in parasitology in the fall of 1928. Dr. Mayhew took his doctor's degree at the University of Illinois, majoring in parasitology.

PLANT PATHOLOGY

Mr. H. H. Flor resigned in June, 1929. He was succeeded by Mr. L. H. Person. Mr. Person has a master's degree from the University of Minnesota.

Mr. T. C. Ryker was added to the staff October 1, 1929, as assistant, in a new project on a study of the root system of sugar cane. Mr. Ryker is a graduate of Mississippi A. & M. College.

POULTRY

Mr. C. W. Upp, who took his bachelor and master's degrees at Oklahoma A. & M. College, was made head of the department of poultry in the fall of 1928. Mr. G. W. Knox, who was instructor in poultry, was in charge of both teaching and research. He resigned to accept a position at the University of Arkansas. He was succeeded by Mr. W. M. Ginn, who received his bachelor and master's degrees from North Carolina Agricultural College.

SUGAR CANE

Arrangements were made in the fall of 1928 by which this Station would cooperate with the Bureau of Chemistry and Soils in a study of the fertility of soils of the sugar cane section. Mr. S. J. Breaux, a graduate of this Institution, was elected to represent the Experiment Station in this cooperation.

Mr. E. C. Simon, a graduate of this Institution, was elected in the fall of 1929 to assist Mr. W. G. Taggart in his work with sugar cane at this Station.

In the summer of 1928 Dr. Warren Whitcomb and Dr. E. Oertel were sent to this Institution by the United States Department of Agriculture, for the purpose of beginning investigations in bee culture.

AGRICULTURAL ENGINEERING

CANE FREEZING

Whipple

A refrigerator was built to freeze standing cane artificially in order to help study the problem of how to lessen the loss of damage from freezing on a crop of sugar cane in Louisiana, and incidentally to determine what temperature is required to kill the eyes at various heights on the stalk, to split standing cane and to cause rapid deterioration for milling; also to determine if this deterioration varies with different varieties of cane, with stage of growth and maturity, with kind of soil and condition of soil moisture, with the duration of low temperature and climatic conditions following the freeze.

A portable refrigerator large enough to freeze a row 18 feet long of standing cane was built and preparations were made to start the experiments on December 3rd. The natural freezes made it necessary to postpone the experiments until the beginning of the 1930 harvest season.

AN INVESTIGATION OF MILLING OF P. O. J. CANES

Whipple

The milling of high fibered P. O. J. sugar cane in Louisiana has been studied with the idea of suggesting necessary changes to existing equipment and the best type of new machinery to successfully extract the juice without danger of breakage.

Questionnaires were sent to about fifty sugar mills asking for dimensions, settings, pressures and figures showing capacities and extractions obtained. The information furnished has been supplemented by personal visits to many of the mills and a study of the control of the different factories.

A study of results shows the benefits of coarse grooving and special juice grooves as well as the use of revolving cane knives. It also indicates the best settings and hydraulic pressures for different types of grooving. Many changes suggested have resulted in better extractions and increased capacity.

ARTIFICIAL CURING OF HAY

Whipple-Barr

Artificial curing of hay was undertaken because of the large possible yields of hay crops in Louisiana and the enormous loss of these crops from rains during the process of natural curing.

A revolving drum type continuous hay drier was designed and built, which under test had a capacity of one quarter ton dry hay per hour. This machine was successful in producing economically a high grade hay.

During the past year a larger drier with a drum 6′x40′ has been built along the same lines as the original drier. To date the following maximum capacities have been obtained: 2600 pounds of dry alfalfa hay, and 1600 pounds of dry soybean hay per hour. An evaporation of 8 pounds of water per pound of oil was obtained which is equivalent to an efficiency of 50 per cent.

Application papers for patent have been filed in the name of the University.

A STUDY OF THE DEFICIENCIES OF AGRICULTURAL IMPLEMENTS APPLIED TO SUGAR CANE CULTURE

Barr

The purpose of this experiment is (a) to test out under Louisiana conditions sugar cane machinery which is being used successfully in other countries; (b) to test out and determine the feasibility of using sugar cane machinery which has proven successful in other row crops. To date little progress has been made on this project.

PRODUCING CORN AND SOY BEANS WITH MECHANICAL POWER

Barr

Through this experiment data are to be secured which will help in determining whether or not tractor power can be profitably utilized for producing corn and soybeans under conditions such as found on sugar plantations.

Planters and cultivators for the general purpose tractor have been found only fairly successful and several changes have been necessary in order to secure better results under conditions as found on the alluvial lands of the cane belt. The costs of production secured are under those as reported by a survey made by the U. S. Department of Agriculture on 25 farms in the alluvial section of Louisiana. The results are best summarized by the following table:

LABOR AND POWER SUMMARY ON 40.05A

OPERATION	Acres	TOTAL HOURS				HOURS PER ACRE				Costs—Acre Basis				Acre Hrs	REMARKS
		M.	Tr.	T.	W.	M.	Tr.	T.	W.	M.	Tr.	T.	W.		
Discing—Fall	40.05	27.41	27.41	.....	.....	.685	.685	....	....	.137	.514	....	....	1.46	Scale:
Plowing—Flat	22.52	56.42	56.42	.....	.....	2.50	2.50	....	....	.50	1.88	....	....	.40	Tr. Operator. Man hr. 1.75
Discing—Spring	22.52	15.85	15.85	.....	.....	.705	.705	....	....	.141	.529	....	....	1.42	Team hr. .16 Woman hr. .10
Bedding	22.52	28.8	28.8	.....	.....	1.28	1.28	....	....	.256	.96	....	....	.78	Tr. hr. .75
Reversing Rows	17.53	20.0	20.0	.....	.....	1.14	1.14	....	....	.228	1.14	....	....	.88	Not flat plowed
Harrowing	48.62	19.18	19.18	.....	.....	.393	.393	....	....	.079	.294	....	....	2.54	Pegtooth-high gear
Planting	40.05	55.4	27.7	.....	.....	1.38	.69	....	....	.258	.517	....	....	1.46	2 men used
Replanting	8.57	11.62	5.81	.....	.....	1.38	.69	....	....	....	....	....	....	1.46	
Cultivating	40.05	107.3	107.3	.....	.....	2.68	2.68	....	....	.536	2.01	....	....	1.49	Avg. 4 cult.
Thinning	40.05	60.0	.....	.....	368.0	1.50	....	....	9.2	.262	....	....	.92	......	
Plowing drains	40.05	394.	.....	39.4	.....	.87	....	.87	....	.152	....	.139	....	1.15	
Shovelling drains	40.05	4540.	.....	.....	.....	11.35	....	....	....	1.99	....	....	....	......	Necessary 5 times
Plowing-ditch bank	40.05	46.9	.....	46.9	.....	1.17	....	1.17	....	.205	....	.187	....	.855	Necessary 1 time
Harvesting	40.05	499.4	.....	108.9	.....	12 47	....	2.42	....	2.18	....	.387	....	......	Av. yield: 21.88 bu.
Miscellaneous	40.05	108.8	.....	.....	.....	2.72	....	....	....	.476	....	....	....	......	Cost: .659 bu.
Total	....	1546.	308.5	190.7	368.	38.7	7.71	4.8	9.2	6.96	5.78	.763	.92		$14.42 per A labor & power not inc. ditch maintenance

M=Man. W=Woman. Tr.=Tractor. T=Team.

DEPARTMENT OF AGRONOMIC RESEARCH

COTTON INVESTIGATIONS

Brown

At present much attention is being given to cotton breeding with the hope of developing or securing a well adapted cotton variety for each of the main cotton growing sections of the State. Numerous individual plant selections are made in fields of certain of the best adapted varieties available. Progenies from these selections are grown and tested for two or more years. Strains that appear promising are increased in isolated fields. Numerous crosses of different varieties are also made each year with the idea of combining in one variety good characters found in two or more varieties. In connection with the breeding work, variety studies were made in twelve different places the past season. In these tests some of the strains that we have developed made a splendid showing. Express-317 ranked first in six of the twelve tests, was third in three, and had an average rank of 3.17 in all the tests of the State. Delfos No. 2, another one of our selections, ranked high, being second in rank for the entire State. Other of our strains also ranked well. It is not to be expected, however, that any one strain will be especially well adapted to various parts of the State. The work thus far indicates that Delfos is the best variety for the alluvial lands of the State if a staple cotton is wanted. Where a short staple variety is wanted, especially in the northern uplands of the State, Delta and Pine Lands No. 4-8 appear to be the best. For wilty soils Dixie-Triumph probably is best.

In cotton spacing experiments at Baton Rouge two stalks per hill twenty inches apart gave best yields on both the Bluff and Alluvial lands. In a date of planting test running from the first of April until the middle of May, April 11 gave best yields. In a plowing test in which deep, medium, and shallow depths were used there seemed to be practically no difference when measured by yields and height of plants. The deep plowing caused much more shedding of forms.

CORN INVESTIGATIONS

Brown-Stoneberg

In the corn breeding work an effort is being made to secure a strain that is outstanding in yield of grain and which possesses, along with other desirable characters, an ear that is well covered with husks such as will give it good weevil protection. The method being used consists of selection in inbred lines followed crossing. Although hundreds of inbred families have been grown for several years and many crosses made, nothing outstanding has been secured.

Variety studies made in twelve different tests scattered over the State in 1929 showed the prolific varieties to be the best yielders. Cocke's Prolific ranked 1st, Hastings' Prolific 2nd, Whatley 3rd, and Yellow Creole 4th. Sentell's White Dent made the best record of the one-ear varieties.

In corn spacing work on fertile alluvial land with rows four feet wide, stalks twelve inches apart in the drill gave best yields.

Soy beans planted in rows of corn when corn was planted caused a reduction of 23.6% in yield of corn but a yield of 6,044 pounds of soybean hay was obtained. Placing a value of $10.00 a ton on this hay gives a total value per acre for hay and grain of $58.00, while the grain in the corn plats alone was worth only $41.90. Planting soy beans and corn in every row gave a yield of 40.7 bushels of corn, while planting the two in alternate rows gave 36.6 bushels of corn. Where beans and corn were in alternate rows the yield of hay was 324 pounds per acre more than in the other plats.

Planting corn on high beds and cultivating with a turning plow gave slightly more corn than level cultivation.

SOY BEAN INVESTIGATIONS

Gray

A limited amount of soy bean breeding has been carried on by the Experiment Station each year for several years. This has resulted in the production of several strains of beans that have decided merits for Louisiana conditions. One of these strains, Biloxi-61, ranked first in production of hay in the various variety tests conducted over the State the past season. Other selections are being made and the ones we have are being tested and purified. In the eleven variety tests made in the State in 1929, which were just mentioned, Biloxi-61 ranked first in hay production, Otootan second, Biloxi third, Tanloxi fourth, Laredo fifth, Mammoth Yellow sixth, George Washington seventh, and Illinois Ebony eighth. On account of the ravages of the soy bean caterpillar it was impossible to get reliable data on yield of seed.

Soy beans were used in different cultural experiments with corn. These have been mentioned in the corn discussion. In a rate of soy bean seeding experiments 20 pounds per acre gave 15,400 pounds of beans, green weight, 30 pounds gave 14,550 pounds, and 40 pounds gave 13,750 pounds. The corn grain weights were nearly the same on all plats. In this experiment the soy beans were planted in the rows of corn at the time the corn was planted.

SUGAR BEET INVESTIGATIONS

Brown

Ten acres of sugar beets were grown during the past season. This comprised variety and fertlizer tests on both Bluff and Alluvial lands, and about six acres planted on commercial scale. Fair to good crops were made on both types of soil but sclerotium root rot destroyed 60 or 70% of the beets on the Bluff land. The alluvial land produced about ten tons per acre. The beets on the Bluff land were allowed to stand until July so that selections might be made for rot resistance. No consistent results were obtained from any of the fertilizer or variety tests.

MISCELLANEOUS CROP WORK

A limited amount of work is being done on oats, winter cover crops, and different forage crops. Results from these experiments will be reported later.

FERTILIZER INVESTIGATIONS

Meyer

The fertilizer work under the supervision of Dr. Meyer covers technical studies of the comparative nitrogen losses from the soil of a field of soy beans and corn where the crop is turned under at different times during the year; and the rate of aging of reverted phosphate.

In addition to the more technical work mentioned various fertilizer tests for corn and cotton are being made in different parts of the State to see what fertilizers are needed and how much may be used with profit.

A test on the comparative efficiency of various nitrogen fertilizers which has been conducted on the Bluff land soil at Baton Rouge for three years shows an average gain of 378 pounds of seed cotton per acre from use of 200 pounds of nitrate of soda. Calcium nitrate ranked second in efficiency and gave an increase of 278 pounds of seed cotton per acre. Some twelve different sources were used. Others gave less profitable returns.

One hundred pounds of nitrophoska applied as a fertilizer for cotton gave an average annual yield for a three year period of 1325 pounds of seed cotton per acre, while a home mixed having the same nitrogen, phosphoric acid and potash values gave an average yield of 1499 pounds.

One hundred pounds of calurea gave an average annual yield of 1652 pounds of seed cotton per acre, while 227 pounds of nitrate of soda, containing an equivalent amount of nitrogen, gave an average annual yield of 1713 pounds. This was for a two-year period.

In a general fertilizer experiment on Bluff land at Baton Rouge in which 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 50 pounds of muriate of potash were used as a basic fertilizer, nitrogen gave the greatest gains per unit of plant food. Consistent increases were obtained up to an application of 250 pounds of nitrate of soda. Superphosphate and potash gave less marked increases.

OUTFIELD WORK

Gray-Cotton

In the outfield fertilizer tests 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 200 pounds of kainit were used as a basic fertilizer in all cases except at Calhoun, where 50 pounds of sulphate of potash were substituted for the kainit.

At Calhoun an increase in yield of about 150 pounds seed cotton was obtained from the use of superphosphate in a mixed fertilizer, about 400 pounds from nitrogen, and 250 pounds from potash; 300 pounds of superphosphate, 300 pounds of nitrate of soda, and 125 pounds of sulphate of potash gave the best results.

At Crowley phosphoric acid gave an increase of 400 pounds of seed cotton, nitrogen about 230 pounds and potash about 270 pounds. The most profitable amount of superphosphate was 600 pounds, sodium nitrate 100 pounds, and kainit 150 pounds.

At Dixie, in the Red River valley, an increase of about 200 pounds of seed cotton per acre was obtained from the use of superphosphate, 130 pounds increase from nitrate of soda, and 80 pounds from kainit; 600 pounds of superphosphate, 150 pounds of nitrate of soda, and 200 pounds of kainit gave most profitable returns.

At Hammond splendid increases were had from the use of all three fertilizers, 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 200 pounds of kainit were the most economical.

At Homer, on North Louisiana hill land, only phosphoric acid and nitrogen gave an increase in the yield of seed cotton. This may have been due to the fact that the land used had had heavy applications of potash in former years. The use of 150 pounds of superphosphate and 250 pounds of nitrate of soda in a mixed fertilizer was the most profitable.

At Lafayette, on prairie land, the test in 1929 showed no marked increase from the use of phosphoric acid. This was probably due largely to the natural fertility of the land used. Another field in the same locality that was used a previous year gave good returns from phosphoric acid. The use of 250 pounds of nitrate of soda in a mixed fertilizer gave an increase of about 300 pounds of seed cotton in 1929.

At Monroe in the Ouachita valley, no increase in yield of cotton was obtained from the use of phosphoric acid in a mixed fertilizer. Potash gave decided increases. A fertilizer mixture consisting of 300 pounds nitrate of soda and 250 pounds, gave the most economical returns.

At Natchitoches, in the Red River valley, phosphoric acid in a mixed fertilizer gave no additional yield. Nitrogen gave an increase of 222 pounds and potash 109 pounds.

Corn fertilizer tests were conducted on the Bluff Land at Baton Rouge, and on Alluvial Land at Raceland and Thibodaux. There were some gains from the use of fertilizers in nearly every case but in most instances the increase did not pay for the fertilizers used. Nitrogen gave the best returns but its use was not profitable at Baton Rouge in any instance, and not at the other places on several of the plats.

ANIMAL INDUSTRY

The experimental projects here reported in Animal Industry were begun since January 1, 1928, with the exception of the sweet potato work commenced in December, 1927. There was little available material at that time for experimental work with livestock. Since then, the following equipment has been installed.

An experimental feed house, scales and cutting chutes, on the lower beef farm, and four 50 acre pastures for beef cattle work, as planned in 1927 by Prof. E. L. Jordan, were completed early in 1928. Since January, 1929, an experimental steer feeding barn 120x25 has been built, with digestion laboratory and feed lots; a sheep barn 16x46 with two four-acre lots for work with sheep, and six experimental hog lots 50x125 equipped with water, sheds, feeding floors and self feeders. An ultra-violet mercury vapor lamp has been purchased for use in studying rickets in young pigs.

A brief report on experimental work to date is given below:

SWEET POTATOES FOR SWINE

Francioni

Questions relating to the feeding of sweet potatoes to swine are of considerable interest in Louisiana on account of the large amounts of cull potatoes annually available. Sweet potatoes are particularly lacking in protein, and an important and necessary factor in successful feeding appears to be that of portein supply.

In the fall of 1927, the swine department had available a large supply of cull sweet potatoes. A preliminary experiment with tankage as a supplement showed a feeding value for cull potatoes of 30.7c per 100 pounds when fed with tankage and 14c when fed alone.

In 1928, four acres of sweet potatoes were planted especially for feeding in the field, and the field divided into two equal lots. One lot received tankage in a self feeder, and the second lot had no supplement. The tankage fed pigs produced one pound gain from 21.3 pounds of potatoes, and one-half (.46) pound tankage. The pigs on potatoes alone required 35.7 pounds per pound gain.

In 1929, sweet potatoes and tankage were compared with sweet potatoes and soy beans, all fed in the field. Feeding was begun while the vines were still green.

Results obtained to date indicate that Lot I, fed tankage, put on one pound gain for 16.7 pounds potatoes with vines, and Lot II, fed soy beans, required 20.4 pounds potatoes with vines for one pound gain.

VITAMIN STUDIES WITH SWINE

Francioni

To study a possible vitamin deficiency in young pigs in winter and early spring, a series of experiments has been planned to investigate the problem with possible methods of prevention or cure.

A preliminary test was made in the spring of 1929 on the value of cod-liver oil in a fattening ration (about 3%). The lot receiving a small amount of cod-liver oil (5% of the supplemental mixture) gained 1.56 pounds per day at 8.5c per pound gain. Those getting no cod-liver oil gained 1.38 pounds per day at 8.7c cost per pound. Measurements of both lots showed a slight increase in size in favor of cod-liver oil. This test will be repeated in 1930.

An experiment just beginning will test various methods of treating brood sows previous to farrowing. Treatment with cod-liver oil and ultra-violet light will be used on both sows and young pigs. The effects of green feed, sunlight, and mineral supplements will be included later.

PROTEIN SUPPLEMENTS FOR SWINE

Francioni

The object of this series is to compare various Louisiana protein feeds for swine with standard digester tankage, and to discover some of the best and cheapest local combinations of proteins for swine.

A preliminary experiment was conducted in 1928 with the following supplements. The basal ration in each case was corn—three parts and rice polish one part.

Lot No.	PROTEIN SUPPLEMENT	Gain Per Day
1	Swift's digester tankage	1.8 lb.
2	Shrimp meal	1.75
3	Tankage 3, Soybeans 1, Alfalfa 1, Cottonseed meal 1	1.67
4	Shrimp bran 3, Soy beans 1, Alfalfa 1, Cottonseed meal 1	1.88
5	Rapides cracklings tankage	1.88

The differences were not very marked, and might have been due in part to variation in individual pigs. It seemed evident, however, that the shrimp bran was improved by mixing with other proteins.

FATTENING CATTLE WITH GRAIN ON PASTURE

Bray

This experiment was planned primarily to determine whether grain feeding on pasture could be made profitable, and secondarily to test the effect of such feeding on the quality of meat.

Comparison of Grain Feeding with Pasture Only—1928 (Average)

	LOT I Grain and Pasture	LOT II Pasture Only
Days on feed	240	240
Initial wt. Feb. 22	415	402
Final wt. Oct. 17	791	620
Gain per day	1.57	.91
Initial value @ 8c per lb.	$33.20	$32.16
Sale weight—St. Louis	$726.1	$562.2
Sale price per 100 pounds	$10.68	$8.75
Value at St. Louis	$77.57	$49.19
Selling cost (freight—commission)	$6.17	$4.78
Feed cost	$24.11	$1.18
Charge for pasture	$3.00	$5.00 out
Charge for labor	$3.00	
Net return	$8.09	$7.25

The market was very low when these cattle were sold, and the returns were unsatisfactory. Returns on Lot I were especially low compared to the grade placed on the carcasses. Due to this low price, the grain feeding showed no appreciable advantage.

SECOND EXPERIMENT—1929

In 1929, twenty two-year-old steers were used; with one lot of yearlings from the University herd fed for comparison. The ration fed was five pounds brewer's rice and 1.5 pounds cottonseed meal per day.

Summary of Results—1929 (Average)

	LOT I 2-year old Grain and Pasture	LOT II 2-year old Pasture Only	LOT III 1-year old Grain Pasture
Days on feed	112	112	112
Initial weight	570.3	573.8	514.7
Final weight, July 12	818.7	757.3	769.4
Gain per day	2.2	1.64	2.2
Initial value @ 11c per lb.	$62.73	$63.12	$56.61
Sale weight New Orleans	777.5*	713.5*	710.
Sale price per 100 lbs.	$11.94	$9.89	$13.00
Sale value per head	$92.72	$70.59	$92.41
Selling cost	$2.50	$2.50	$2.50
Cost of grain feed	$14.95		$14.70
Est. labor cost	$3.00		$3.00
Charge for pasture	$3.00	$4.00	$3.00
Profit per head	$6.54	$ .97	$12.59

*Pounds.

The results of this test were considered very satisfactory for pasture feeding.

BRAHMAN CATTLE IN LOUISIANA

Bray

A comparison is being made on beef calves by a Hereford sire, and calves by a Brahman sire, out of native and grade Louisiana cows. Two equal groups of cows, twenty-five in each, were bred in 1928, one to each sire, and the calves weighed at regular intervals during the summer of 1929.

On July 15, the Brahman calves weighed 285 pounds, as compared to 232 pounds for the Hereford calves, a difference of 62 pounds. The Hereford calves were valued on this date at 11½c per pound as compared to 11c for the Brahmans. On this basis, the Brahman calves were worth $31.35 per head compared to $25.65 for Herefords.

Six Brahman heifers are being retained for further comparison and for crossbreeding. A comparison with six Hereford grade heifers of similar age shows that the Brahman heifers are gradually losing their difference in weight over the Herefords. They being only 30 pounds heavier than the Herefords in December, as compared to 53 pounds heavier in July.

The results to date would indicate that the Brahman cross is very satisfactory for producing calves for market.

Whether this advantage is maintained at later ages remains to be proved.

VELVET BEANS FOR WINTERING CALVES

Bray

A preliminary study of velvet beans for beef calves was made during the winter of 1928-29. Thirty-one calves were put on 24 acres of corn stalks and velvet beans from November 15, 1928, to February 11, 1929. Gains produced were 93 pounds per head, or 1.06 pounds per day. Estimating the value of the velvet beans at 12c per pound for each pound of beef produced, the value of the beans was $13.92 per acre in addition to 15 bushels of corn per acre. The velvet bean crop was not as heavy as is often produced in this section. The work is being continued this year.

MOLASSES FOR FATTENING CATTLE

Snell

A new experimental feeding barn 120′x25′ with feeds lots adjoining was erected this summer for experimental work in fattening cattle. This will take care of four test lots of ten steers each, and in addition contains a 24′x25′ laboratory for digestion trials, with a basement 18′x25′.

Forty yearling steers were purchased in October, and placed on feed November 23. The following rations are being fed:

Lot I. Corn, cottonseed meal, hay
Lot II. Corn, cottonseed meal, molasses, hay
Lot III. Corn, cottonseed meal, corn and soy bean silage, hay
Lot IV. Corn, cottonseed meal, silage, molasses, hay.

LAMB PRODUCTION

To investigate types of lambs and methods of producing lambs for market in Louisiana, an experiment has been started comparing Hampshire and Southdown rams on native Louisiana ewes. A sheep shed 16′x46′ was built during the summer and an eight acre dog proof corral is being completed. Breeding will be begun in June for fall lambs.

MOLASSES FOR WORK MULES

Snell-Taggart

In cooperation with W. G. Taggart of the Sugar Station, investigations were begun this summer dealing with the use of blackstrap molasses in the ration of mules on the experimental sugar farm. A preliminary test was made during the past summer (1929). The molasses-soy bean hay ration cost 19c per day as compared to 41c for corn and soy bean hay. The molasses fed mules did not consume as much feed, and did not hold up as well in hot weather, showing that molasses alone is not satisfactory as the only concentrate for work mules.

Much credit for work done during the past two years must be given to Professor J. B. Francioni, Jr., and Dr. M. G. Snell in the Animal Industry Department. Neither of these men was officially on the Experiment Station staff until July 1, 1929, but each has nevertheless carried on considerable experimental work in addition to his other duties. Prof. Francioni has had immediate supervision of the experimental work with swine, and Dr. Snell is in the molasses feeding work and the work with sheep.

ANIMAL PATHOLOGY

HARRY MORRIS

ANAPLASMOSIS IN CATTLE

Several cases of anaplasmosis developed in the beef cattle herd during the month of October, 1927. The mortality rate was 50%. Four animals survived the attack and were isolated from the rest of the herd. One animal has been retained for experimental purposes and is still a carrier of the disease. Marginal bodies may be found on the red blood corpuscles and blood transfusions have produced the disease in susceptible animals with an incubation period of nineteen days.

From a limited number of preliminary fly transmission tests the results seem to indicate that infection may be transmitted from an infected animal to a susceptible one through the interrupted feeding of the large black horse fly, *Tabanus atratus.*

Isolation of carriers of the disease seems to be the best known method of control. This plan has given excellent results on the University farm as the disease has not re-occurred in the herd since the original outbreak.

BLINDNESS IN CHICKENS

Blindness in chickens is prevalent throughout the state of Louisiana. In some flocks as high as ten per cent of the chickens have suffered from the condition. From a study of blindness in more than fifty cases results seem to indicate the condition is not associated with paralysis. A blind chicken may become paralyzed through malnutrition. A blind chicken may live to old age if given proper care and attention. Attempts to transmit the disease by contact proved negative.

Post-mortem examination of blind chickens showed 70% of cases to be infected with coccidiosis, 50% with round worms, 55% with tapeworms, 20% with capallaria. No infectious diseases were found.

As the cause of blindness and method of transmission are not definitely known, it is recommended that the general laws of sanitation be practiced in attempting to control the disease.

DEPARTMENT OF SOIL BACTERIOLOGY

M. B. STURGIS and W. P. DENSON

THE PRODUCTION OF ALCOHOL FROM CANE BAGASSE

The investigation of the possibilities of recovering the residual sugars in bagasse, by a fermentation process, which was begun in 1927, was continued through 1928 and 1929. The object of the investigation was to determine if the keeping qualities of bagasse could be so improved by the removal of its sugars by fermentation that its deterioration in storage could be entirely prevented or greatly reduced. The results showed that bagasse has a value of from three to six dollars per ton, as a source of alcohol, when used in conjunction with final molasses in the process of fermentation commonly employed in molasses distilleries. However, by using bagasse, much more concentrated mixtures of molasses may be fermented efficiently, and calculated on the increase yields of alcohol, the bagasse under these conditions would have a value of from twelve to fourteen dollars per ton, merely as an aid to fermentation. The spent bagasse would have lost none of its value for fibre board manufacture, for which purpose it could be employed as well as before. While the spent bagasse was found to be still susceptible to deterioration in storage, it could be rendered entirely insusceptible to such changes by subjecting it to a subsequent acetic fermentation.

THE ACCELERATING EFFECT OF INERT SUBSTANCES UPON THE ALCOHOLIC FERMENTATION OF MOLASSES

The accelerating effect of bagasse upon the rate of fermentation of molasses, suggested a more comprehensive study of the underlying causes of this action. An investigation was therefore carried out in which various finely divided substances were tested, and their effect upon the alcoholic fermentation of molasses observed.

THE EFFECT OF TURNING UNDER CANE TRASH UPON THE AVAILABLE NITROGEN OF THE SOIL

This investigation which was begun several years ago, has been very actively prosecuted during the period covered by this report. The following are the most important facts that have been developed by our investigation. (1) The addition of fresh cane trash to soils results in a very rapid and pronounced depression of soil nitrates. This decrease in nitrates is more often than otherwise accompanied by slight gains in total nitrogen, which indicate that the nitrates are merely transformed into organic nitrogen rather than lost through denitrifying changes. (3) The depressing effect of fresh trash is rather quickly lost and after it has been in contact with the soil for several months it causes a much more gradual immoblization of available nitrogen. (4) The addition of trash which has been in contact with soil for several months, and partially decomposed, to pots planted to corn, gave an increased rate of growth and an increased total yield of dry matter in the plants. (5) The addition of cane trash to soils increases their water holding capacity and decreases their rate of drying, indicating that in periods of drought or insufficient rain fall the presence of trash might be of material benefit to plant growth.

DAIRYING

R. H. Lush

Research work in dairying was started in July, 1929, and this report can only outline the different projects and investigational work started.

FEEDING INVESTIGATIONS

1. *Grain as a Supplement to Pasture.*

Good pastures aid greatly in maintaining milk production at a low cost. Preliminary investigations indicate that dairy cows of the University herd producing a pound of butterfat per day received over 60 percent of their nutrients from pasture over a period of eight months. To determine then the production possible from pasture and the proper amount of grain to add for most economical milk roduction, three groups of nine cows each are being fed on pasture or roughage alone, roughage plus limited grain or roughage plus a normal amount of grain. Wire cages are being constructed to determine the amount and composition of grass produced by the pastures in which the cows graze.

2. *Rotation System of Grazing.*

In order to determine the most profitable use of pasture in milk production, it is planned to alternate one group of cows between two small pastures as compared to another group grazing continuously on the same acreage of pasture.

3. *A comparison of the Continuous Feeding of Cottonseed Meal and Soy Bean Oil Meal on Growth and Milk Production.*

In view of recent developments in the field of animal nutrition, it appears desirable to test the supplementary effect of protein feeds over a long period of time. As cottonseed meal is readily available and because of the increased interest in soy bean production, these two products are being compared. Two groups of Holstein heifers are fed a succulent roughage, yellow cornmeal and either cottonseed meal or soybean oil meal with a mineral supplement of ground oyster shells. This comparison will be continued throughout one lactation period with a reversal of rations for the second period. Growth and milk production will measure the value of the two protein supplements but it is planned that this project shall also give some information on the value of hay in the dairy ration.

4. *Effect of Crop Grown and Soil Treatment on Milk Production.*

This project has been started at the North Louisiana Experiment Station to measure the value in terms of milk production of various pasture crops. Rye and vetch, oats, and Sudan grass will be grazed as supplementary pasture crops. A native pasture has been divided and seeded with a grass mixture for studying the effect of lime, lime plus manure, manure alone and no treatment. By developing a year round pasture system and gathering data on the milk produced per acre by various crops and treatments, it is felt that the results will be of considerable value to the dairy farmers of North Louisiana in reducing costs of production.

5. *Methods and Cost of Raising Dairy Calves and Heifers.*

A study of the amount of milk and feed fed to heifer calves in the dairy herd is being made and continued until calving date. A preliminary study of 8 calves shows an average of 1086 pounds whole milk and 1363 pounds skim milk consumed in 239 days, 422 pounds grain, 319 pounds hay and 772 pounds silage to one year of age. This represents an average feed cost of $65.24. In an effort to reduce this cost, part of the calves are changed to skim milk at an early age and fed a grain ration containing 20 percent skim milk powder. The amount of skim milk is reduced as more grain is consumed. Weights and height at withers are maintained to study the growth made. This project should give valuable information on the cost of replacing cows in herds where whole milk is sold.

OTHER INVESTIGATIONS

1. *A study of the Value of a Purebred Dairy Bull Mated to Common Cows.*

Ten grade Jerseys were purchased for this project at the North Louisiana Experiment Station. A model dairy barn with room for 10 cows, a feed room and milk room with cooling system have been completed. A hay and shelter shed and a calf shed have been provided. A good Jersey bull is being mated to these cows and each heifer calf will later be given the same opportunity for production on home grown feeds as its mother now receives. It is planned that this project shall also serve as a demonstration of the importance of liberal feeding of home grown feeds and proper care of dairy cattle and milk products.

Other work not included in projects is a study of feed costs and pasture returns in milk production, daughter and dam comparisons of records, weights and gains of dairy cattle on pasture, feed costs of dairy sires and effect of certain fertilizers on pastures.

ENTOMOLOGY DEPARTMENT

FUMIGATION OF GRAIN

Spencer

A number of tests of paradichlorobenzene ("P. D. B.") have been made in corn cribs and small bins, to find out if this material could be used for grain fumigation, in place of carbon-bisulphide ("high life"). A dosage of 20 pounds of the P. D. B. per 1,000 cubic feet of space killed the corn weevils as well as a 15-pound treatment with carbon bisulphide, and the protection lasted longer, but an objectionable flavor was imparted to the grain, and this flavor was pronounced in eggs from hens fed fumigated corn, and in milk from cows receiving this corn in the ration. Experiments with smaller dosages of P. D. B., and with other fumigants, are in progress.

CANE BORER CONTROL

Hinds-Spencer

In testing insecticidal materials for borer control, more than fifty brands, modifications or mixtures of silicofluoride dusts have been tested. Among them have been found several giving a substantially higher borer larval mortality than was obtained at the same time from "Jungmann's Extra Light with 10% hydrated lime" which, up to that time, was the dust used most extensively. The burning of cane foliage was not a serious matter in any of these tests.

In trash disposal tests at Cinclare in 1929 the plats burned over thoroughly showed only 17% of borer larvae alive during the first week of March, while plats with trash partially burned showed 52% and those with trash left on the surface of the ground showed 50%.

In a test of the value of using "borer-free" seed at Cinclare, the borer infected seed plat showed in August only 86% of the stand of cane that occurred in the "borer-free" plat.

The 1928 and 1929 work on this project has included a study of the relations of weather, parasites and predators to the control of the sugarcane borer. The predator of most importance (*Chauliognathus,* a soldier beetle) searches for borer larvae in their burrows, and eats them. Experiments with *Trichogramma Minutum* have shown that this beneficial parasite can be kept over winter in our laboratory, and subsequently can be increased there in great numbers for distribution in sugarcane fields. The Experiment Station reared more than sixteen million *Trichogrammas* in 1928, and a larger number in 1929; the colonizations were made in fields ordinarily severely infested with borers ("front cuts"), and checked the activity of this pest, and a good crop of cane was obtained.

SOIL ANIMALS ATTACKING SUGAR CANE ROOTS

Spencer-Stracener

An investigation of the soil animals associated with the condition known as "Root-rot" or "Growth Failure" of sugar cane. Field surveys have brought to light a number of species of animals, mostly insects, which live among the sugar cane roots. Most of the species are harmless or beneficial; but laboratory, greenhouse and field experiments have shown that the springtails *"Lepidocyrtus* and *Onychirus* and the *Symphylid Symphylella* "pit" sugar cane roots, eat off the lateral feeding root-branches, and attack the "eyes" of planted cane.

In controlled experiments in the field, the soil animals mentioned above have reduced top growth fourteen percent, have reduced cane weight eighteen per cent, and have slightly lowered the sucrose percentage.

In cooperation with the Plant Pathology Department, large-scale field tests are in progress with the soil animals and soil fungi.

AGRICULTURAL ECONOMICS

Saville-Reuss

Among recent developments of the Experiment Station is the establishment of the Department of Farm Management. This department is at present devoting attention to research in the economy of farm organization and operation. Two major types of farming, those of rice and sugar cane, are covered in projects outlined for this year and now in the process of execution.

For these studies emphasis is placed upon crop and livestock enterprise combinations, management practices, and their relation to farm returns. Special details concerning individual practices in handling the major enterprises have an important place in this work. It is realized that such studies are successful only to the extent that the individual farmer may improve his organization through the aid of such information. Details of individual farm business practices are being secured in order to determine the most profitable system for an individual farm.

Another significant phase of the studies is that relating to the use of mechanical power and its effect upon changes in farm organization and the management practices.

The problem of mechanical power utilization is being studied in order to determine the adequacy of present types of such power in use, efficiency and capacity of these types, operating costs and causes of variations, and men and workstock displacement.

It is the aim in the research work of this Department, when studying different types of farming and different sizes of farms of a given type, to secure data which will enable individual managers to so organize and operate their business that the highest net income may be secured from the resources at their command. Economy of production and a maximum net return is the goal of achievement.

THE AGRICULTURAL CREDIT SITUATION IN LOUISIANA

Thompson

Purpose of Project: To make a cross section analysis of the agricultural credit situation in Louisiana based on 1928 operations, to determine the following:

(1) The factors affecting the agricultural credit needs of the State;
(2) To what extent these needs are met;
(3) Agencies supplying credit to Louisiana farmers;
(4) The conditions of credit as to term, costs, uses, and security required;
(5) Recent changes that have taken place with respect to agricultural credit;
(6) Methods and proper procedure for further study of the problems of rural credits in Louisiana.

Results of the Study:

(1) Types of farming, racial differences and financial status of individual farmers affect the credit needs of the different rural sections of Louisiana.

(1) Economic conditions in Louisiana farm communities would be improved if all credit institutions were to abolish the practice of granting credit without proper security.

(3) While the existing institutions are supplying ample credit to farmers who are in a position to obtain credit, there are many farmers who are unable to negotiate loans and this condition, in cases, is brought about by circumstances over which the farmer has no control. Therefore in small communities where farmers are predominently tenants and small owner-operators, credit unions organized under the Act of 1924, may be advantageous.

(4) Small inefficient national farm loan associations can be consolidated to an advantage, where it is possible, and competent secretary-treasurers employed.

(5) Merchant credit as supplied at present is too expensive and wherever conditions are suitable, farmers will find it advantageous to borrow cash from the bank or some other lending institution at the going rate of interest and eliminate store credit.

(6) Apparently there is a distinct place for more agricultural credit corporations in the State and farmers can take advantage of this source of intermediate credit at reasonable rates of interest by a closer cooperation among themselves and between farmers and financial agencies.

(7) Farmers will find it advantageous to insist upon a closer cooperation between bankers, extension workers and themselves,, so that information and advice from the different agencies working with the farm group may be best available.

(8) Apparently loans are properly timed in the different areas of the State to meet the time requirements. Long term loans and short term loans seem to be adequate, for those who are able to get credit.

(9) A number of non-specialized lending agencies are getting out of the field of mortgage loans and the Federal Land Bank is becoming more important.

This study has brought out the importance of further study which should include such projects as:

(1) A detailed study of agricultural credit corporations in the State with the view of discovering their place in the credit system in different farming areas of Louisiana.

(2) The causes underlying farm forecloseures in Louisiana.

(3) Credit as a factor influencing land utilization in the cut-over pine lands of Louisiana.

(4) A detailed study of how credit can change the tide of tenancy in the State and help the landless farmers to become owners of the land they cultivate.

(5) Factors affecting the efficiency of credit institutions and their effect on Louisiana's agriculture.

HORTICULTURAL DEPARTMENT

JULIAN C. MILLER

Since the horticulture investigational work was just started in August, 1929, there will be no data presented in the Annual Report of this year. However, a brief outline of the projects started will be given.

A. VEGETABLES

1. CABBAGE BREEDING

Since cabbage is one of the leading truck crops and since considerable loss occurs each year from premature seeding, a project has been outlined to study the mode of inheritance of this particular character. Efforts will also be directed to breeding strains which are resistant to premature seeding and which are also resistant to cold.

2. SELECTION AND BREEDING OF THE CREOLE ONION AND OTHER BULB CROPS

At present, practically all the work on this project will be devoted to the improvement of the Creole onion through breeding and selection. Due to the variability of this onion as to size, shape and date of maturity the demand for Louisiana onions has been on the decline; also it has been hard to find enough good seed for interested onion growers to plant. It is hoped through breeding that a pure strain of Creole onion may be obtained.

Other phases of onion work are also being considered, especially variety and strain tests; also planting distances.

3. SELECTION AND BREEDING OF CAYENNE, SPORT AND TABASCO PEPPERS

The pepper growers around New Iberia and St. Martinsville find it almost impossible to obtain pure strains of the above named peppers. They have called upon the Experiment Station to breed pure strains of these so that they may be able to obtain pure seed. Tabasco pepper wilt has caused considerable losses and efforts will be made to breed resistant strains of this variety.

4. LEGUMES AS A SOIL BUILDER FOR TRUCK CROPS

With the increased acreage planted to truck crops and with the decrease of horses, sources of manure are inadequate to supply the necessary humus to keep up production. It is, therefore, the purpose of this experiment to conduct trials with some of the leading legumes in rotation with truck crops to secure data as to their relative economic value. Comparisons will be made with stable manure alone and with plats receiving neither legumes nor manure.

5. IRISH POTATO INVESTIGATONS

The following experiments have been outlined:

a. To determine the most desirable percentage of phosphorus, nitrogen and potash.
b. To determine rate of application of complete fertilizers, varying from 2,000 to 400 pounds.
c. Comparisons of nitrophoska 1, 2 and 3 with other standard fertilizers.
d. To determine the effect of ethylene chlorohydrin as a chemical for breaking the rest period in new and old potatoes.
e. To determine the most economic size of seed pieces under Louisiana conditions.
f. To determine the best planting distances in the row.
g. Sources of commercial seed potatoes.
h. Cooperating with the northern Experiment Station in testing new strains of Triumph seed potatoes.

All experiments with potatoes will be conducted both at Houma and at the University Experiment Station.

6. SWEET POTATO INVESTIGATIONS

a. To determine the best percentage of the individual elements, phosphorus, nitrogen and potash.
b. To determine the best rate of application of complete fertilizers.
c. Strain tests of Porto Rican variety to determine the sources of some of the leading strains of the Porto Rican; also the Yellow Jersey and Priestly Jerseys will be tested.

d. To determine the best planting distances for Louisiana conditions.
e. To study the frequency of vegetative mutations occurring with the Porto Rican variety; also the growth performance of various strains of Porto Rican that have already been isolated by means of vegetative mutations.

7. BEAN CROP INVESTIGATIONS

With string beans the following experiments will be conducted:

a. To determine the most economical rate of application, both from the standpoint of truck crop and canning crop, of complete fertilizers.
b. To determine the most desirable percentage of the individual elements, nitrogen, phosphorus and potash.
c. To determine the best planting distances both with the drill and hill method.
d. To conduct variety and strain trials. Comparisons will be made between certified and non-certified bean seed.

8. VARIETY AND STRAIN TESTS

Variety and strain tests will be conducted with most of the leading truck crops, especially beets, carrots, sweet corn, sweet peppers, and other truck crops as will be found desirable.

B. FRUIT

1. ORANGES

A small Satsuma orange grove has been planted and a fertilizer experiment will be outlined to determine the effect of the rate of application of the various elements and rates of application of complete fertilizers. This grove will also be used for conducting spray tests and other experiments to improve the cultivation practices of the Satsuma orange industry.

2. PECANS

For the purpose of determining the best varieties for this particular section of the State a grove has been planted. This grove will also be used for conducting fertilizer experiments and spraying tests for the control of insects and diseases.

3. SUMMER APPLES

An experiment has been started with summer apples at the North Louisiana Experiment Station and partly supplemented at the Louisiana Experiment Station at Baton Rouge; primarily for the purpose of determining, if possible, the advisability of growing early summer apples, especially in North Louisiana. The leading varieties of summer apples have been planted, and the orchard will be handled as a commercial orchard.

CO-OPERATIVE WORK WITH IRISH POTATOES

An arrangement was made last summer by which the Bureau of Plant Industry, the Louisiana Experiment Station and Terrebonne Parish would carry on investigations with Irish potatoes. The Bureau of Plant Industry is interested in testing new strains of potatoes that have been developed in Northern states. The Experiment Station and the parish are cooperating in this work. The Station is interested not only in the testing of new strains but in fertilizer tests, tests of cultural methods and in testing potatoes from different states. All of this work has been started this spring.

Terrebonne Parish is one of the largest producers of beans in the State. Arrangements have been made to do some work on testing varieties of beans and also fertilizer tests for beans.

HOME ECONOMICS

GERTRUDE SUNDERLIN

THE ANTI-RACHITIC EFFECT OF ACIDOPHILUS MILK

A study is being made to determine whether or not acidophilus milk has any greater preventative or curative effect on rickets than milk which is not inoculated. The results are, at the present time, inconclusive.

HOME CANNING OF MEAT UNDER CONDITIONS IN LOUISIANA

The project in home canning of meat was planned to obtain a comparison of the keeping qualities of meats canned in glass jars and in tin cans, meats stored in a warm room and those stored in a basement, and meats processed under 15 pounds pressure for 45 and for 60 minutes with those processed in the boiling water both for 3 and for 4 hours.

192 No. 2 tin cans with composition gaskets and 203 pint glass mason jars with new rubber rings and zinc caps were used to can 395 pounds of beef and pork. The meat was from animals that had been killed less than 24 hours. The cans and jars were stored 7 to 8 months, inincluding the summer months.

No spoilage which was attributed to underprocessing occurred in any of the jars or cans. No imperfect seals or leaks were found in the glass jars. No rubber rings had deteriorated to break the seal. The spoilage due to leaks in tin cans occurred for the most part in those stored in the basement and in those that had been held for the longest processing period. In part, this was due to the dampness of the basement causing pin hole perforations from rust. The explanation for leaks occurring more often in the 60 minute process is being sought.

The experiment will be repeated, using paper gaskets instead of composition gaskets in the tin cans and using a drier basement for the cool storage.

Although the meat processed in the boiling water bath showed no spoilage which was due to underprocessing, we do not, at the present time, recommend this method for use in Louisiana due to the possibility of botulism poisoning.

POULTRY

CONFINEMENT OF CHICKENS

Upp

The matter of sanitation with poultry is of paramount importance in Louisiana. One phase of this problem is being given careful attention in a study just started to find out the advantages and disadvantages of rearing chicks in confinement and keeping laying hens and breeding hens in confinement. Confinement, in this sense, means keeping the chickens entirely off the ground. Preliminary results of this study will be given next year.

SIMPLE VS. COMPLEX RATIONS—SHRIMP BRAN AS A PROTEIN FEED FOR LAYING HENS

Ginn

Two other problems are being studied for the first time this year. The use of shrimp bran as a protein supplement for laying hens is being determined. Shrimp bran is manufactured by a number of companies in Louisiana and is available at reasonable prices. If it proves to be a suitable feed, it should reduce, materially, the cost of the laying ration.

Farm poultry raisers often feel that rations recommended by state universities contain too many ingredients. To be able to definitely answer this question feeding tests are being conducted using simple rations (few ingredients) and complex rations (larger variety of ingredients). No results are, as yet, available.

RICE BY-PRODUCTS IN THE LAYING RATION

Ginn

Louisiana produces about one-half the rice grown in the United States. This causes rice bran, rice polish, and brewer's rice to be available for feed at reasonable prices. For the past two years experiments have been conducted at Louisiana State University to determine the value of these rice products as feed for laying hens. The tests are being continued, but the results so far indicate that rice products are good feed for laying hens. Those rations which contained from 10% to 30% rice products gave as good results, and in some instances better results, than did the standard ration (containing no rice products) which was used as a check pen. Although not conclusive proof, these results do strongly indicate that Louisiana poultrymen can economically replace some of the other grain products in the laying ration with rice products.

RICE BY-PRODUCTS FOR CHICKS

Upp

In experiments conducted last spring rice by-products were used in the rations of growing chicks. Coccidiosis caused the test to be terminated when the chicks were six weeks old, but up to that age, the chickens fed rations containing rice bran, rice polish, and brewer's rice in various combinations grew as rapidly as did those fed a standard chick ration, except in one case in which practically one-half of the ration was rice products. These tests indicate that rice products can be used successfully in chick rations if not fed too heavily, (probably not over 30% of the entire ration).

THE EFFECTS OF HIGH AND LOW EGG PRODUCTION ON HATCHABILITY OF THE EGGS

Upp

Many poultry keepers believe that if a hen lays many eggs prior to the hatching season, the eggs will not hatch so well, nor will the chicks be as vigorous as if the hen "rests" before the breeding season. This problem has been studied this past year, and this work will be continued for several years before definite conclusions are drawn. The first year's work gave the following results. The number of eggs laid previous to the breeding season did not materially affect the fertility of the eggs. For the hens considered, the number of eggs laid prior to hatching time did not materially affect how well the eggs hatched, how rapidly the chicks grew, nor what percentage of the chicks lived.

STORAGE OF LOUISIANA EGGS

Upp

For the past three years, the poultry department of Louisiana State University has co-operated with Swift & Company at New Orleans on the problem of cold storage of Louisiana eggs. The trade has discriminated against southern eggs for storage purposes, maintaining that excessive shrinkage occurs and further objecting to the frequent occurence of "olive yolked" or "grass" eggs. Some dealers have gone so far as to state that southern eggs cannot be successfully stored. The results of the experiment for the past three years refute this statement, as Louisiana eggs have been successfully stored for the past three seasons. It must be remembered, however, that *only high quality, fresh* Louisiana eggs have been stored. Any eggs to be successfully stored must be *fresh* and *carefuly handled* before storing. No new causes of olive yolked eggs have been found, but it appears that causes exist other than those previously recognized. Observations have shown that methods of managing the flocks and the eggs, (prior to placing them in storage) greatly affect the actual loss and loss in quality of all eggs. The percentage shrink of Louisiana eggs was found to be no greater than that of eggs from other sections of the U. S. These tests demonstrate that Louisiana eggs can be successfully stored *if the flocks are well cared for* and *the eggs properly cared for* and *stored while fresh.*

PAROSITOLOGY

R. L. Mayhew

COCCIDIOSIS IN FOWLS

The purpose of this project is to study coccidiosis in fowls. The work was started on September 1, 1929, using S. C. White Leghorn chicks. They were kept under screen and on hardware cloth, and fed from the same feed. The inoculations were made individually with a medicine dropper. The results thus far are concerned with the cycle of the organisms and the effects on the chickens.

The time required for the oocysts to reach the infective stage varies from 19 to 28 hours. Twelve cultures have been accurately studied and it has been observed that if sporulation occurs it usually occurs within 24 hours. Three inoculation experiments were carried out to test out the infective properties of cultures 19, 20.5, and 24.5 hours old. Positive results were obtained in all three with the result that a total of ten chickens became definitely infected. One chicken in each experiment in which the cultures 19 and 20.5 hours old were used developed hemorrhage. Twenty uninoculated chickens kept in the same brooder with part of these and fed the same feed remained free. Hemorrhage occurs on the 5th or 6th days.

In studying the length of time chickens remain infected, it was found that in 37 chickens surviving a number of inoculations one was infected 62 days after hemorrhage had occurred, while 3 were negative after 24 days, 2 of the 3 having had hemorrhage. That reinfection had not occurred is indicated by the fact that 17 which were negative on April 24th were still negative on June 21st, and of the 20 that were positive on April 24th, 19 had become negative on June 31st.

Results of infection upon the weights of infected chickens show that there is usually a failure to gain after infection. Of the chickens surviving a number of inoculations, 17 are females and 22 males. Of the females, 8 had been lightly infected and 9 heavily infected. Of the males, 12 had been lightly infected and 10 heavily infected. The degree of infection was based on the occurrence of hemorrhage and the relative number of oocysts observed in the feces. The average weights of the heavily infected males were nearly 15% less than those of the lightly infected, while the average weights of the heavily infected females were a little over 12% less than the lightly infected at 16 weeks of age. Infection occurred during the 8th and 9th week. Individual chickens usually fail to increase in weight and frequently show considerable loss during the second week after inoculation.

PLANT PATHOLOGY

TOMATO WILT

Edgerton-Tims

The two wilt resistant tomato varieties, Louisiana Red and Louisiana Pink, which have been developed in Louisiana have been continued and further selections made. Seed of these varieties has been sent from time to time to California where seed has been grown for southern seedsmen.

The value of these two varieties on wilt-infested soil is shown by a variety test which was conducted at Baton Rouge in 1929. The results are given in the following table:

Table I. Results of tomato variety test on wilt infested soil at Baton Rouge

Variety	Average No. plants per plat	Average wt. fruit in pounds
Norton	45	74.1
Louisiana Pink	45	136.1
Earliana	45	71.6
Kanora	43	94.3
Marglobe	42	86.1
Stone	42	51.4
Louisiana Red	45	140.4

SCLEROTIUM WILT DISEASES

Tims

The *Sclerotium* wilt disease is one of the limiting factors in the growing of sugar beets in Louisiana. If sugar beets are allowed to remain in the field after warm weather begins, losses as a result of the beets rotting may run as high as fifty to seventy-five percent. The addition of lime in large quantities to the soil has failed to reduce the injury although it is known that the parasite prefers an acid soil. As far as tried, fertilizers have no material effect on the severity of the disease.

SUGAR CANE DISEASES

1. SUGAR CANE MOSAIC

Edgerton-Tims-Mills

Investigations carried on over a period of years have shown that it is possible to select strains of certain of the cane varieties which show considerable tolerance to the mosaic disease. Tolerant strains of D 74 and Purple have been grown for a number of years. In 1929, plots of selected D 74 produced at the rate of 23.6 tons per acre, while plots from unselected cane made only 17.3 tons. These yields were very satisfactory considering that the plots were badly affected with seepage water in the spring. In 1928, plots of selected D 74 made as high as 36 tons per acre. This work is now being enlarged to include some of the POJ canes.

In 1929, tests were conducted to determine the effect of mosaic on some of the commercial cane varieties. Replicated plots were planted with mosaic and mosaic-free seed cane of the varieties, Striped, POJ 36, POJ 36 M, and POJ 234. As plant cane, no significant differences were noticed between the plots of the POJ varieties planted with healthy and diseased seed.

2. RED ROT STUDIES

Edgerton-Tims-Mills

The red rot disease which is quite destructive to certain cane varieties has been found commonly attacking the leaf midribs of certain varieties. To determine whether the leaf parasite is identical with the one found in the stem, a great many different leaf cultures have been obtained. Stalk inoculations have also been made with one of these cultures. This culture was found to be more parasitic on Co 281, CP 177, CP 807, POJ 36 and POJ 36 M than on Purple, a variety which is known to be very susceptible to red rot. Inoculations with a number of different parasitic strains are now under way.

3. POKKAH-BONG STUDIES

Edgerton-Tims-Mills

Surveys made during the past two years show that POJ 234, POJ 2727, CP 177, Striped, and Purple are the important varieties which are very susceptible to the Pokkah-bong disease.

The organism, *Fusarium moniliforme*, which investigators in Java and Cuba claim to be the cause of the disease has been isolated and used in inoculation experiments. Pokkah-bong symptoms have been produced with this fungus but the results have not been entirely consistent.

4. BACTERIAL DISEASES

Edgerton-Christopher

The two bacterial diseases of cane which were found for the first time in Louisiana in 1927 have been studied. These troubles are being called the (a) mottle stripe and the (b) red stripe and top rot.

The mottle stripe disease occurs commonly on such varieties as D 74, SC 12/4, and POJ 2727; while varieties like POJ 213 are quite resistant. Varieties seriously affected by the red stripe and top rot include POJ 2727, POJ 2725, and POJ 826, while the varieties POJ 213, 234 and 36 are moderately susceptible.

A STUDY OF A SPECIES OF PYTHIUM IN ITS ACTION ON SUGAR CANE

Flor

I. Species of Pythium have been found to be connected with the disease known as root rot or growth failure. Temperature tests made with some of these Pythiums on agar plates showed that 30°C is about the optimum for growth; while at 36°C and 15°C, growth was very slow. Inoculations, however, on corn showed that the greatest injury occurs at 25°C or below. Soil moisture tests showed that Pythium injury to corn is much more severe in soils with moisture content ranging from 70 to 100T of the water-holding capacity. This showed both in germination and subsequent growth of the corn. The hydrogen-ion relations of the parasitic Pythium was determined. Growth occurred between pH 5.6 and 9.6, but the optimum growth took place between 6.0 and 8.5.

Flor

II. Other possible factors concerned in the root rot complex of sugar cane have been considered. No evidence was found that inorganic salts or soluble toxins are concerned in the root rot problem. Washing the soil had no effect on the growth of sugar cane, but steaming the soil made conditions more favorable for rapid growth.

The root knot nematode, *Heterodera radicicola* (Muller), and a burrowing nematode, similar to *Tylenchus similis* (Cobb), were found in the roots of sugar cane in Louisiana, but never in sufficient quantities to be a major factor in the root rot problem. *Lepidocyrtus violentus* (Folsom), a soil inhabiting, root pitting insect slightly injured the growth of cane in steamed soil. In Pythium infested soil, this insect seemed to increase the injury caused by Pythium. A species of Rhizoctonia produced discolored lesions on the roots of sugar cane, but did not appreciably reduce growth.

III. To determine the effect of soil treatment on the root rot disease of cane and corn, a number of chemical compounds were added to plots in areas known to be seriously affected with the disease. Both cane and corn were planted. Observations were made on the growth of the cane, and at regular intervals root samples were examined for the presence of Pythium. No compound has been found to have a noticeable effect on the growth of cane in the field, or on the prevalence of Pythium on the roots. But the addition of ammonium sulphate and liquid ammonia to corn in root disease infested soil brought about increased yields. In one test where amonium sulphate and Uspulum were used, an increase of 12 bushels per acre was obtained.

The table shows the comparative yields from the different treatments.

Treatment	Quantity added per acre	Bushels per Acre Average of 3 plots
Ammonium sulphate	180 lbs.	26.0
Uspulum 1-400	400 gals.	21.8
Ammonium sulphate	600 lbs.	24.5
Ammonium sulphate+Uspulum 1-400	600 lbs.-400 gals.	30.3
Check-Water	400 gals.	18.3
Liquid ammonia	150 lbs.	25.2
Liquid ammonia	500 lbs.	26.3

ROOT DEVELOPMENT OF SUGAR CANE

Edgerton-Ryker

Studies on the development and growth of sugar cane roots were commenced in the late fall of 1929. It has been found that from 65 to 70% of the cane roots are in the upper eight inches of soil, and approximately 90% in the upper fourteen inches.

STRAWBERRY DISEASE INVESTIGATIONS

Plakidas

The strawberry diseases known to occur in Louisiana include the leaf spot (rust, bird's eye spot), the scorch, the dwarf (white bud, wild plant), the root-knot (nematode injury), the root-rot and the various berry rots. Investigations in the nature and control of these troubles have been carried on for two years.

The leaf diseases (leaf spot and scorch) have been controlled effectively by spraying with 4-4-50 Bordeaux mixture every week to ten days from about the first of January to the first week in March. In tests made at Hammond in 1929, three sprayings (January 8th, 18th and 28th) resulted in partial check of the leaf diseases, while six sprayings at ten-day intervals (January 8th-March 7th) gave practically complete control. The addition of ammonia to the spray (at the rate of one or two pints in 50 gallons of the spray mixture) had no noticeable effect either on the control of the leaf spots or on the growth of the plants.

While the cause or nature of the dwarf disease has not been definitely established as yet, it can be effectively controlled under Louisiana conditions, where the plants are reset every year, by roguing and plant selection. Experiments have shown that if plants are carefully selected during planting and dwarf plants are rogued out systematically during the summer and early fall, very little dwarf will be found in the new plantings.

The root-knot disease is relatively of very minor importance in Louisiana, due to the fact that strawberries are reset every year and the plants grow during the cold months when nematodes are inactive. Only occasionally are plants found severely infested with nematodes.

The root rot disease is characterized by the failure of the plants to make a satisfactory growth. The cause, or causes, of root rot are not known and the factors influencing this trouble are imperfectly understood. Studies on this phase of the problem are in progress. Application of lime (2000-4000 pounds per acre), both in the field, at the Fruit and Truck Experiment Station in Hammond, and in pots in the greenhouse stimulated plant growth in 1929. Whether lime will have the same effect in other fields is not known. These experiments are being repeated. The effect of various organisms parasitic on the roots is being studied.

The different fruit rotting diseases exact a heavy toll on the berry crop when conditions are favorable for their development. Wet, warm weather favors these troubles. During the last two years, the weather conditions (dry weather during the picking season) was decidedly unfavorable, and so the damage from fruit rots has been slight.

SUGAR

The work with sugar cane on varieties and general field work has been continued as outlined without any material change.

VARIETIES

Taggart-Simon

More than one thousand new seedling canes grown at Canal Point, Florida, and some new foreign varieties were shipped to us by the Office of Sugar Investigations at Washington, D. C. These were all put under tests in nursery plats and grown for observation in preliminary tests. The most promising were planted in larger acreages for further examination. Some very interesting new varieties were discovered.

Co 290, an Indian cane, bred after the Java principles, has been used for two years. This cane has many desirable qualities. So far, no sign of any disease whatever has shown up, and it has made a very satisfactory growth of plant and first year stubble. It strips remarkably well and has matured as early as our commercial canes.

CPH 22, which is a seedling containing D 74 blood, also shows considerable promise.

CPH 145, which has been under tests for a year, seems to be an extraordinary early maturing variety, and may be well worthwhile as a substitute for POJ 234.

CPH 150, a luxuriantly growing cane, free from disease, with satisfactory sucrose content shows some promise.

In 1928, Co 281, CP 130, CP 177, and CP 807 were sent to the test fields. In 1929, Co 290 and CPH 22 were sent to the test fields. In 1929, POJ 36 M, a selection out of POJ 36, was released for distribution, and the Louisiana Sugar Station grew about one hundred and seventy-five tons for seed cane to be distributed to our people.

During both 1928 and 1929, the Station furnished quantities of seed cane of varieties 234, 36 and 213. Deliveries varying from small bundles to carloads were made to the Louisiana cane growers for planting purposes.

FERTILIZER AND ROTATION WORK

Taggart-Simon

The fertilizer and rotation work continued to bring out the fact that the proper use of legumes is a most essential fact in soil fertility. Where one year crop of legumes had been turned under previous to growing sugar cane, fertilizer on stubble cane at the rate of 36 pounds of nitrogen per acre, gave increased yields of about 10 tons. Whereas, if two crops of legumes had been turned under previous to planting sugar cane, the same quantity of fertilizer on the stubble cane showed an increase of only 6 tons. In neither the three year nor four year rotation did it pay to use fertilizer on the plant cane, but in every case, nitrogen applied to stubble cane gave profitable returns.

The question of effect of harvesting legumes for hay in comparison with turning under the crop was studied, and in every case where hay was taken out of the field, a decreased yield in the crops which followed was shown in comparison with land where legumes were buried. This decrease in yield continued to show even where nitrogenous fertilizer was applied to the respective plats in the succeeding crop.

In the four year rotation, consisting of two years of corn and legumes, plant cane and stubble cane, land where legume crop was turned under produced 34.67 tons of plant cane; land where a legume crop was harvested showed 32.1 tons; land where the legume crop was harvested and a half of a ration of nitrogen applied to the plant cane showed 32.36 tons; land where the legume crop was harvested and a full ration of nitrogen substituted for the legume crop showed 31.14 tons; or in other words, commercial nitrogen was not successfully substituted for the legume crop. The stubble crop following this plant cane showed as follows: Two years legumes *turned under* with no nitrogen applied to either the plant or the stubble crop produced 24.32 tons; 2 years legumes *harvested* with no nitrogen applied to either the plant or stubble produced 21.96 tons; with Melilotus on the plant cane, the yield was increased to 25.37 tons; with one-half a ration of nitrogen in place of the Melilotus a yield 25.95 tons; with Melilotus on the plant cane and one-half ration of nitrogen on the stubble a yield of 28.23 tons; with a full ration of nitrogen, or 36 pounds, on the stubble crop a yield of 30.71 tons was secured. These figures show the necessity of using nitrogen on stubble crop, and also the comparative value of nitrogen in legumes as compared with commercial fertilizers.

A comparison of cowpeas against the Biloxi beans shows the stubble crop, after Biloxi beans turned under, produced two tons more than stubble crop after cowpeas turned under.

Using corn to measure the effect of the organic nitrogen in legumes, we find that corn following a crop of legumes in comparison to corn grown after stubble cane is increased 17 bushels per acre. Corn grown after one crop of legumes turned under in comparison with legumes harvested for hay is increased 10 bushels per acre.

In the comparison of source of nitrogen tests, six different material were used: Nitrate of soda, sulphate of ammonia, calcium cyanamid, Urea, calcium nitrate, and Leuna saltpeter. Increased yields were profitable in all cases. Nitrate of soda again gave the highest returns; with Leuna saltpeter, sulphate of ammonia, calcium nitrate, cyanamid, and Urea grouped closely together in the order named followed, showing an increase of about 10 tons from an application of 36 pounds of nitrogen per acre.

SUGARCANE TEST FIELDS

Gouaux

During the year 1928 the Experiment Station sugar cane test field project consisted of two series of replicated variety plots, viz., (1) plant cane; and (2) first stubble. The work is conducted on established test fields, representing five representative sections of the cane belt as follows: (1) Cinclare, upper Mississsippi river; (2) Reserve, lower Mississippi river; (3) Napoleonville, Bayou Lafourche; (4) Franklin, Bayou Teche; and (5) Youngsville, western section. In the fall of the same year a new test field was started at Meeker, representing the extreme northern Red river alluvial section of the cane belt. In the test field project the three field grown varieties: POJ Nos. 36, 213 and 234, along with some of the most promising seedling varieties, such as 36M, Co 281, C.P. 807, C.P. 177, C.P. 130 and POJ 2725, are planted side by side in one-twentieth acre plots according to the checkerboard method and replicated at least five times. The varieties are being tested in order to obtain data and information about the behavior of these canes in representative localities for the benefit of sugar planters of Louisiana. The results for the seasons of 1927 and 1928 have been published in Louisiana Bulletins Nos. 202 and 203.

In the fall of 1929 another series of plant cane plots was planted at each of the six Station test fields. In addition to the regular replicated series, the following promising new seedling canes were planted: C.P.H. 22, Co 290 and C.P.766.

In 1928 the variety POJ 213 made the best showing as plant cane, and was closely followed by POJ 36. The POJ 213 variety was also superior as first year stubble, followed by 36M. The 36M variety was released for field planting in September, 1929.

The test field variety work for 1929 consisted of the following three projects: (1) plant cane; (2) first stubble; and (3) second stubble. The data, information and final results of this work are being prepared for a bulletin. The plant cane records show that C.P. 807 has surpassed all varieties in tonnage yields, and compares favorably in sugar yields with POJ 213. Co 281, another new variety, is also making a favorable showing. POJ 213 again made an excellent showing, being followed by 36M and POJ 36. POJ 234, as usual, was lower in field yields but higher in sugar per ton yields. The first year stubble results show POJ 213 as the leading cane, followed by 36M and POJ 36. POJ 234 also made an excellent showing, both in tonnage and sugar yields. In the second stubble results POJ 213 was the leading variety in the alluvial section; while POJ 36 was superior in the Teche and western sections.

THE EFFECTS OF FREEZES ON P. O. J. CANES

For the past three years systematic work has been performed on this project in different localities of the cane belt. The results of 1928 show that the bud and most of the eyes of POJ Nos. 36, 213 and 234 have to be completely killed by freezing weather before it is considered advisable to windrow cane for the mill. If the cane is windrowed when the bud is still alive or partially killed, under average weather conditions the cane will undergo rapid deterioration. Standing cane killed by freezes, bud and most of the eyes killed, will remain in a fair state of preservation for a period of about fifteen days. Both standing and windrowed canes on black lands undergo more rapid deterioration than on the lighter soil types. Windrowed cane in poorly drained lands also deteriorate rapidly. Canes with high sugar content are more resistant to freezes, and suffer less deterioration both from the standpoint of standing and windrowed.

The results for 1929 prove very definitely that after the bud and most of the eyes of cane have been completely killed by freezes, that the cane that has to be milled after an interval of 15 to 18 days should be windrowed immediately after the freeze in order to keep in a fair state of preservation. Windrowing cane 10 days to two weeks after killing freezes to protect cane from extreme low temperatures as occurred on December 19 and 20, 22-24, 1929, proved to be very good practice, as cane windrowed under such conditions was much better for milling than standing cane. POJ 36 showed the greatest resistance to freezing weather, and less deterioration both as standing and windrowed cane. POJ 213 plant cane which was immature and in most cases badly bored, was damaged more by the freezes, and showed the greatest amount of deterioration both as standing and windrowed. POJ 234 which naturally runs high in sucrose, was not damaged as much by the freezes and showed less deterioration than POJ 213, both standing and windrowed.

FIELD EXTENSION WORK

In the fifteen sugar parishes comprising the sugar cane belt of the state, the County Agents were visited at regular intervals throughout the year. The following program of work was outlined for these parishes:

(1) Seed Cane Selection.
(2) Land Preparation.
(3) Cultivation.
(4) Fertilization.
(5) Control of Diatraea Saccharalis.
(6) Legume and Fertilizer Demonstrations.
(7) Demonstrations in the proper use of Melilotus indica as a cover crop on fall plant cane.
(8) Sugar cane varieties.
(9) Crop diversification.

In these nine projects excellent progress was made with the following: Sugar cane varieties; planting and turning under of soy beans, land preparation, cultivation, fertilization, fertilizer demonstrations and crop diversification. The general use of fertilizers on stubble cane can largely be attributed to fertilizer demonstrations conducted during the past three years. A large number of planters was given assistance in figuring fertilizer requirements, and participated in cooperative purchases of fertilizer materials at low prices. In 1929 a total of 75 fertilizer demonstrations were conducted in the 15 sugar cane parishes. The following fertilizer organizations contributed free fertilizer materials: Chilean Nitrate of Soda, Synthetic Nitrogen Corporation and Barrett Company. The final results of these fertilizer demonstrations will be prepared and published in mimeograph or circular form. The results of this work indicate that the Experiment Station recommendation of 35 to 40 pounds per acre of readily available nitrogen on first stubble is the most profitable amounts to use. The 32 pounds of phosphoric acid in the form of Superphosphate applied with 35 to 40 pounds of available nitrogen per acre in a good many cases gave negative results for the phosphoric acid. However, in some cases positive results were also obtained.

FINANCIAL REPORT OF THE AGRICULTURAL EXPERIMENT STATIONS, LA. STATE UNIVERSITY
JULY 1, 1927 TO JULY 1, 1928.

	Sugar Cane Fund	Purnell Fund	Adams Fund	Hatch Fund	Feed & Fertilizer Fund	State Fund	Total
Dr.							
Balance July 1, 1927	$ 3,902.11	$	$	$	$	$	$ 3,902.11
State Appropriation	25,000.00					40,000.00	65,000.00
Sales	428.51					16,384.20	16,812.71
Refunds	.25				103.99	611.36	715.60
U. S. Appropriations		40,000.00	15,000.00	15,000.00			70,000.00
Feed and Fertilizer Control					22,007.95	10,913.22	32,921.17
Interest on Daily Balance						133.28	133.28
Loans						25,000.00	25,000.00
Total	$29,330.87	$40,000.00	$15,000.00	$15,000.00	$22,111.94	$93,042.16	$214,484.87
Overdraft, 6/30/28						3,119.15	3,119.15
Grand Total	$29,330.87	$40,000.00	$15,000.00	$15,000.00	$22,111.94	$96,161.21	$217,604.02

FINANCIAL REPORT AGRICULTURAL EXPERIMENT STATIONS, LA. STATE UNIVERSITY—(Continued) JULY 1, 1927, TO JULY 1, 1928.

	Sugar Cane Fund	Purnell Fund	Adams Fund	Hatch Fund	Feed & Fertilizer Fund	State Fund	Total
Cr.							
Overdraft, 6/30/27						266.40	266.40
Salaries	$15,003.87	$25,473.45	$10,925.01	$ 4,691.64	$14,866.46	$17,780.29	$ 88,740.72
Labor	4,999.46	6,895.88	1,565.66	7,386.36	1,801.80	26,258.31	48,907.47
Stationery & Of. Sup.	302.24	43.35	14.25	67.51	221.22	83.43	732.00
Scientific Supplies	1,571.24	481.58	798.76		1,249.48	487.36	4,588.42
Feeding Stuffs		491.02	90.52	106.75		2,087.61	2,775.60
Sundry Supplies	720.41	983.25	171.88	43.69	1,440.70	2,168.04	5,527.97
Fertilizer	30.71	443.24		199.50	25.00	1,443.01	2,141.46
Communication Service		101.69	17.02	137.93	128.45	454.49	839.58
Travel Expenses	2,188.93	1,833.57	135.15		450.00	1,502.65	6,110.30
Transp. Things	300.09	486.70	3.45	26.39	167.65	408.51	1,392.79
Publications	880.90			200.00		374.36	1,455.26
Heat, Lt. Water & Pwr.	16.80	338.38	509.46	173.53	251.05	2,528.39	3,818.11
Furniture and Fixtures	123.10		2.75		20.38	17.50	163.73
Library		14.00	225.60		41.00	77.23	357.83
Scientific Equipment	30.74	5.54	356.72		327.95	224.47	945.42
Livestock		899.37		250.00		2,167.41	3,316.78
Tools, Mach. and Appliances	97.70	1,339.35	8.15	1,705.45	73.11	2,607.20	5,830.96
Buildings and Land	372.59	169.13	175.62	11.25		5,576.93	6,305.52
Contingent Expenses	241.67				85.00	1,424.75	1,751.42
Loans Repaid						28,222.87	28,222.87
Total	$26,880.45	$40,000.00	$15,000.00	$15,000.00	$21,149.25	$96,161.21	$214,190.91
Balance, 6/30/28	2,450.42				962.69		3,413.11
Grand Total	$29,330.87	$40,000.00	$15,000.00	$15,000.00	$22,111.94	$96,161.21	$217,604.02

FINANCIAL REPORT OF THE AGRICULTURAL EXPERIMENT STATIONS, LOUISIANA STATE UNIVERSITY JULY 1, 1928, TO JULY 1, 1929.

	State Fund	Delta Station Parish Fund	Delta Station Univ. Fund	Sugar Cane Fund	Purnell Fund	Adams Fund	Hatch Fund	Feed & Fertilizer Fund	TOTAL
Dr.									
Balance, 6/30/28	$........	$........	$........	$ 2,450.42	$........	$........	$........	$ 962.69	$ 3,413.11
State Appropriation	40,000.00	....	1,233.37	40,000.00	....	....	....	....	81,233.37
Refunds	525.62	....	....	93.47	....	....	....	351.43	970.52
Interest Daily Balance	336.90	24.99	....	....	....	....	....	....	361.89
U. S. Government	....	....	....	....	50,000.00	15,000.00	15,000.00	....	80,000.00
Feed and Fertilizer Control...	....	....	....	....	....	....	....	34,160.92	34,160.92
Insurance on Laboratory	....	....	....	....	....	....	....	206.50	206.50
App. for Cotton Station.......	....	16,000.00	....	....	....	....	....	....	16,000.00
Sales	14,221.23	....	....	5.50	....	....	....	....	14,226.73
Total	$55,083.75	$16,024.99	$ 1,233.37	$42,549.39	$50,000.00	$15,000.00	$15,000.00	$35,681.54	$230,573.04

FINANCIAL REPORT AGRICULTURAL EXPERIMENT STATIONS, LA. STATE UNIVERSITY—(Continued)
JULY 1, 1928 TO JULY 1, 1929.

Cr.	State Fund	Delta Station Parish Fund	Delta Station University Fund	Sugar Cane Fund	Purnell Fund	Adams Fund	Hatch Fund	Feed and Fertilizer Fund	TOTAL
Overdraft, 6/30/28	$ 3,119.15	$........	$........	....	....	....	....	....	3,119.15
Salaries	16,112.23	....	600.00	20,224.55	31,384.96	10,833.33	6,471.65	14,866.65	100,493.37
Labor	20,936.39	....	262.87	4,555.64	5,875.90	1,305.47	5,520.44	1,733.25	40,190.26
Stationery and Office Supplies	226.31	....	....	257.41	196.96	20.88	178.16	200.89	1,080.61
Scientific Supplies	52.98	....	....	461.25	312.29	431.37	....	1,349.53	2,607.42
Feeding Stuffs	627.73	....	27.33	36.00	867.48	254.77	....	515.35	2,328.66
Sundry Supplies	1,618.56	....	12.53	917.89	795.22	67.14	154.60	1,672.77	5,238.71
Fertilizer	1,177.11	....	....	317.26	74.56	....	236.43	50.40	1,855.76
Communication Service	520.53	....	.75	....	49.19	10.00	43.70	150.07	774.24
Travel Expense	2,242.41	....	71.68	2,807.51	842.31	8.25	150.00	603.20	6,725.36
Transportation Things	552.10	....	20.23	240.30	465.68	58.26	7.55	774.90	2,119.02
Publications	4.39	....	....	223.94	....	....	....	....	228.33
Heat, Lt. Water, Power	1,253.89	....	....	116.62	393.61	....	170.66	119.61	2,054.39
Furniture and Fixtures	241.37	....	....	74.23	1,017.10	152.55	367.10	1,043.00	2,895.35
Library	49.20	....	....	....	....	53.65	....	28.50	131.35
Scientific Equipment	15.74	....	....	679.71	1,862.39	80.09	....	48.00	2,685.93
Live Stock	141.40	....	....	....	1,583.76	112.00	875.00	737.50	3,449.66
Tools, Mach. and Appliances	2,668.70	2,200.00	6.00	279.12	2,705.25	1,612.24	212.67	1,001.49	10,685.47
Buildings and Land	1,339.42	....	17.50	47.11	1,573.34	....	386.54	1,721.07	5,084.98
Contingent Expenses	2,059.96	....	4.50	....	....	....	225 50	26.00	2,315.96
Total	$54,959.87	$ 2,200.00	$ 1,023.39	$31,238.54	$50,000.00	$15,000.00	$15,000.00	$26,642.18	$196,063.98
Balance, 6/30/29	123.88	13,824.99	209.98	11,310.85	....	....	....	9,039.36	34,509.06
Grand Total	$55,083.75	$16,024.99	$ 1,233.37	$42,549.39	$50,000.00	$15,000.00	$15,000.00	$35,681.54	$230,573.04

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REPORT OF THE AGRICULTURAL EXPERIMENT STATION FOR THE YEARS 1929-1931

By
C. T. DOWELL
Director

FIG. 1. A general view of a part of the Agronomy plats.

LOUISIANA STATE UNIVERSITY
and
AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATIONS

AGRICULTURAL EXPERIMENT STATION STAFF*

ADMINISTRATION

Carr T. Dowell, Ph. D., Director.

W. G. Taggart, B. S., Assistant Director.

Nathalie Poirrier, Secretary to the Director.

J. K. McHugh, Librarian.

STATE STATION, BATON ROUGE

AGRICULTURAL ENGINEERING

*H. T. Barr, M. S., Assistant Professor of Agricultural Engineering.

AGRICULTURAL ECONOMICS

R. L. Thompson, Ph. D., Agricultural Economist.

R. J. Saville, M. S., Associate Agricultural Economist.

G. H. Reuss, M. S., Assistant Agricultural Economist.

T. Lynn Smith, A. M., Assistant Agricultural Economist.

AGRONOMY

H. B. Brown, Ph. D., Agronomist.

John P. Gray, M. S., Associate Agronomist.

A. H. Meyer, Ph. D., Associate, Soil Technology.

M. B. Sturgis, M. S., Assistant, Soil Technology.

John R. Cotton, B. S., Assistant in Agronomy.

S. J. Landry, Farm Foreman.

ANIMAL INDUSTRY

Chas. I. Bray, Ph. D., Animal Husbandman.

*M. G. Snell, Ph. D., Associate Professor of Animal Industry.

ANIMAL PATHOLOGY

*Harry Morris, D. V. M., Associate Professor of Animal Pathology.

DAIRY HUSBANDRY

R. H. Lush, M. S., Dairy Husbandman, In Charge of Dairy Research.

ENTOMOLOGY

W. E. Hinds, Ph. D., Entomologist.

B. A. Osterberger, M. S., Assistant Entomologist.

C. L. Stracener, B. S., Assistant in Entomology.

HORTICULTURE

*J. C. Miller, Ph. D., Associate Professor of Horticulture.

W. D. Kimbrough, Ph. D., Associate Horticulturist.

Douglas Harper, Farm Foreman.

PARASITOLOGY

R. L. Mayhew, Assistant Parasitologist, In Charge of Research in Parisitology.

PLANT PATHOLOGY

*C. W. Edgerton, Ph. D., Professor of Botany and Bacteriology; Head of Research in Plant Pathology.

E. C. Tims, Ph. D., Associate Plant Pathologist.

A. G. Plakidas, Ph. D., Assistant Plant Pathologist.

P. J. Mills, M. S., Assistant in Plant Pathology.

L. H. Person, M. S., Assistant in Plant Pathology.

Don E. Ellis, B. S., Assistant in Plant Pathology.

POULTRY

C. W. Upp, M. S., Associate Poultry Husbandman, In Charge of Poultry Research.

SUGAR ENGINEERING

*William Whipple, S. B., Professor of Steam Engineering.

SUGAR CANE

W. G. Taggart, B. S., Assistant Director.

C. B. Gouaux, M. S., Associate, Outfield Work.

S. J. Breaux, Jr., B. S., Assistant in Outfield Work.

E. C. Simon, M. S., Assistant.

D. J. DeArensburg, Farm Foreman.

FERTILIZER AND FEED STUFFS LABORATORY

A. P. Kerr, M. S., Chief Chemist.

J. H. Jolly, B. S., Assistant Chemist.

Jesse L. Farr, M. S., Assistant Chemist.

C. C. Moreland, B. S., Assistant Chemist.

W. P. Denson, B. S., Assistant Chemist.

DETAILED BY UNITED STATES DEPT. OF AGRICULTURE

APICULTURE

Warren Whitcomb, Ph. D., Assistant Apiculturist, Bee Culture Investigations.

Everet Oertel, Ph. D., Assistant Apiculturist, Bee Culture Investigations.

CEREAL INVESTIGATIONS

Hugo Stoneberg, M. S., Specialist in Cereal Investigations, B. P. I.

ENTOMOLOGY

C. E. Smith, M. S., Specialist in Truck Crop Insects.

Norman Allen, M. S., Assistant Specialist in Truck Crop Insects.

P. K. Harrison, M. S., Assistant Specialist in Truck Crop Insects.

SUB-STATIONS

DELTA STATION, ST. JOSEPH

C. B. Haddon, B. S., Superintendent.

Douglas Moore, Assistant.

FRUIT AND TRUCK STATION, HAMMOND

B. Szymoniak, B. S. A., Superintendent.

NORTH LOUISIANA STATION, CALHOUN

Sidney Stewart, B. S., Superintendent.

RICE STATION, CROWLEY

J. Mitchell Jenkins, B. S., Superintendent.

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*The members of the station staff who teach are indicated by an asterisk. The words "associate" and "assistant" indicate respectively that the member has the rank of associate and assistant professor. The phrase "assistant in" indicates that the rank is below that of assistant professor. Those who teach are given the same title as that given in the list of the faculty.

REPORT OF THE EXPERIMENT STATION

C. T. Dowell
Director

When the last report from this Station was made, I went into some detail telling the purpose of an Experiment Station and what the policy of the Louisiana Station was. It is not necessary for me to repeat what was said at that time, except that we are trying to develop and maintain a program of investigation which includes major problems of the various agricultural industries of the State.

The results obtained are published in many cases before final conclusions are drawn. Reports on the work are given through the media of newspapers, mimeographed and printed bulletins. This report does not cover the work that is being carried on at the four Substations of the State. The Substations are located at Crowley, Hammond, St. Joseph and Calhoun. The Superintendents of these Stations have made separate reports covering the last two years. These reports will be ready for distribution in the very near future.

New Buildings

There has been but a small amount of money spent by the Station during the last two years for the providing of new buildings. We found it to be necessary to erect five or six small buildings for experimental work with poultry. Some new work was undertaken in the curing of sweet potatoes which made it necessary to build a small potato curing house. Our equipment in the way of buildings for research work with sheep was inadequate. To meet this need a feeding shed was built. These small buildings are all that we have added during the two years.

NEW LINE OF WORK

There have been quite a number of new projects undertaken since the last report. The purposes of these projects are stated by the heads of the different departments. It might be mentioned that last year some work was undertaken with citrus fruit in cooperation with County Agent Dethloff in Plaquemines Parish. It is hoped that results will be obtained from this work that will be of benefit to the citrus industry of the State. Work on the fertilization of Irish potatoes was started last year near Alexandria.

Two fellowships have been obtained during this period. One is known as the Potash Fellowship. This fund is used for carrying on work with potash at the Central Station and at a number of places in the State. The other fellowship was given by The Grasselli Chemical Company. The purpose of the work done under this fellowship is to test the insecticidal properties of barium fluosilicate.

AGRICULTURAL ECONOMICS

At the time the last report was made, very little work had been done in the field of agricultural economics. Since that time, Dr. R. L. Thompson of the College of Commerce, has been made Head of the Department of Research in Agricultural Economics. Dr. Gertrude Sunderlin, who was carrying on investigations in home economics until the end of the last fiscal year, resigned. It was decided not to continue work in home economics, but instead to undertake investigations in rural sociology. Mr. Lynn Smith was appointed to undertake this work. He is devoting the major portion of his time to investigations along this line. A small part of his time is devoted to teaching.

CHANGES AND ADDITIONS TO STAFF

When the last report of this Station was made, the Director was also Dean of Agriculture. Dr. Jas. M. Smith, President of the University, decided at the end of the last fiscal year that it would be in the interest of both teaching and research to have the office of Dean and Director divided. Since the beginning of this fiscal year Professor J. G. Lee, Jr., Head of the Department of Agricultural Education, has been Dean of Agriculture. Since then all of my time has been devoted to the work of the Experiment Station.

I have already mentioned that Dr. R. L. Thompson was made Head of the Department of Agricultural Economics, Dr. Gertrude Sunderlin resigned, and that Mr. Lynn Smith was appointed to begin investigations in rural sociology. The work in rural sociology is a part of the Department of Agricultural Economics.

Beginning with this fiscal year the work of teaching and research in the Departments of Animal Husbandry and Poultry was divided. Dr. C. I. Bray, who had been Head of the Department of Animal Husbandry, is in charge of the research work in Animal Industry and Professor J. B. Francioni is in charge of the teaching. Mr. C. W. Upp, who was Head of the Department of Poultry, is devoting his entire time to research work in that field.

Dr. Herbert Spencer of the Department of Entomology resigned in October, 1930. It was decided not to make a new appointment to succeed him, but to place Mr. B. A. Osterberger, who was already a member of the department, in charge of some of the projects of the department.

PUBLICATIONS

It was decided to include a list of publications of the Station as a part of this report. It will be noted that in the list given below are included bulletins, both printed and mimeographed, and articles written by members of the Staff and appearing in scientific journals. No popular publications are included.

PRINTED BULLETINS

Bulletin
No.

214 "Damage by the rice water weevil proved negligible", By J. W. Ingram and W. A. Douglas. (8 pages—2,500 copies)—August, 1930.

215 "An economic study of factors affecting farm organization and power utilization of sugar cane farms, 1929", By G. H. Reuss. (19 pages—2,000 copies)—November, 1930.

216 "Rice farm irrigation systems in Louisiana, 1929", By R. J. Saville. (19 pages—3,000 copies)—November, 1930.

217 "Some Economic problems in the rice farming area, 1929", By R. J. Saville. (65 pages—2,000 copies)—November, 1930.

218 "Tractors and trucks on Louisiana Rice farms, 1929", (With supplementary data on labor requirements), By R. J. Saville and G. H. Reuss. (39 pages—3,000 copies)—December, 1930.

219 "Financing production and marketing of Louisiana strawberries and suggested reorganization", By R. L. Thompson. (67 pages—3,000 copies)—January, 1931.

220 "Home canning of meat under conditions in Louisiana", By Gertrude Sunderlin. (8 pages—3,000 copies)—January, 1931.

221 "Cotton Price—quality relationships in local markets of Louisiana", By C. W. Farrington. (59 pages—2,000 copies)—May, 1931.

222 "Soil fertility investigations—Sugar cane district of Louisiana", By A. M. O'Neal and S. J. Breaux. (45 pages—2,000 copies)—June, 1931.

223 "Studies on Sugar Cane Roots", By T. C. Ryker and C. W. Edgerton. (37 pages—2,000 copies)—July, 1931.

224 "The organization and financial returns of 129 small sized Louisiana cane farms, 1930", By G. H. Reuss. (39 pages—2,000 copies)—July, 1931.

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Bulletin
No.

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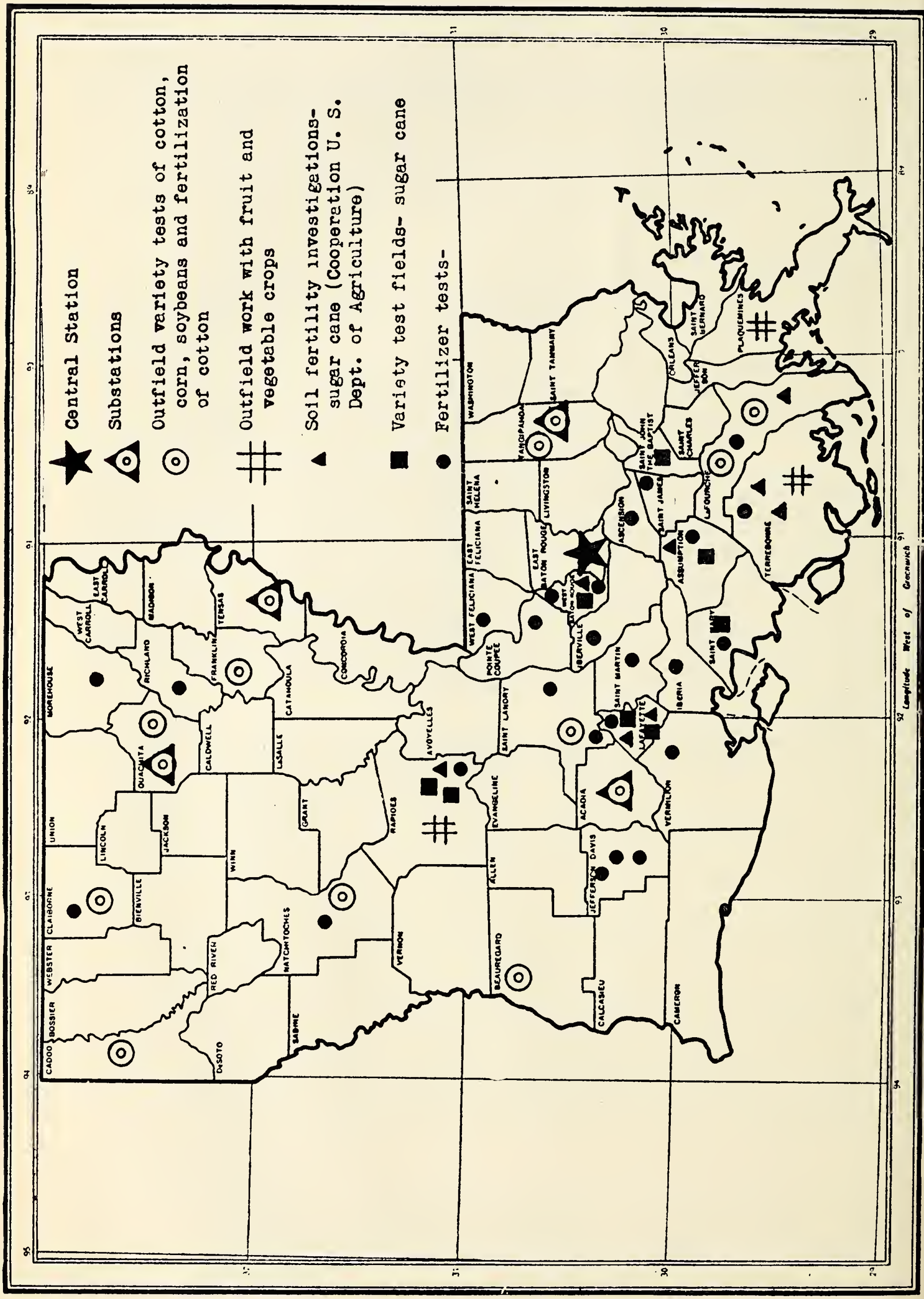
★ Central Station
Substations
Outfield variety tests of cotton, corn, soybeans and fertilization of cotton
# Outfield work with fruit and vegetable crops
▲ Soil fertility investigations- sugar cane (Cooperation U. S. Dept. of Agriculture)
■ Variety test fields- sugar cane
● Fertilizer tests-
CADDO
BOSSIER
WEBSTER
CLAIBORNE
UNION
MOREHOUSE
WEST CARROLL
EAST CARROLL
LINCOLN
BIENVILLE
JACKSON
OUACHITA
RICHLAND
MADISON
FRANKLIN
TENSAS
CALDWELL
DESOTO
RED RIVER
WINN
NATCHITOCHES
SABINE
GRANT
LASALLE
CATAHOULA
CONCORDIA
RAPIDES
VERNON
AVOYELLES
BEAUREGARD
ALLEN
EVANGELINE
SAINT LANDRY
POINTE COUPEE
WEST FELICIANA
EAST FELICIANA
SAINT HELENA
WASHINGTON
TANGIPAHOA
SAINT TAMMANY
LIVINGSTON
EAST BATON ROUGE
WEST BATON ROUGE
IBERVILLE
ASCENSION
SAINT JAMES
SAINT JOHN THE BAPTIST
SAINT CHARLES
JEFFERSON
ORLEANS
SAINT BERNARD
PLAQUEMINES
LAFOURCHE
TERREBONNE
ASSUMPTION
SAINT MARTIN
SAINT MARY
IBERIA
LAFAYETTE
ACADIA
VERMILION
JEFFERSON DAVIS
CALCASIEU
CAMERON
95
94
93
92
91
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89
33
32
31
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29
Longitude West of Greenwich

SOILS AND CROPS

It is the aim in the soils and crops investigations to gather information concerning underlying principles of crop production that is of fundamental importance, and also to gather definite facts in regard to the use of fertilizers, varieties, cultural methods, etc., which may be of direct practical value to the farmers of the State.

The following outline gives a brief reference to most of the projects under way and the more important results.

SOILS WORK

FERTILIZER INVESTIGATIONS

Meyer

Rate of Aging of Reverted Phosphates—The object of the experiment is to determine whether the soil phosphates fixed through phosphate fertilization become less available with age. In other words, may phosphate fertilizers be used as effectively by applying, say every second year or fourth year, as by applying every year, keeping the total amount of phosphates added to the soil for a given period constant.

As this experiment covers a period of 4 years, no results will be available until the end of the test. Incidentally, laboratory work in connection with this field test indicates that the soluble phosphates added to soils in the general fertilization practices revert immediately to the less soluble forms of soil phosphates. Under proper soil moisture conditions and intimate contact with soil, the reversion to the less soluble soil phosphates is largely completed in 24 hours.

Source of Nitrogen—The source of nitrogen test was started in 1927 and has covered a period of 5 years. The purpose of the experiment is to determine the most economical, efficient nitrogen fertilizer. At present, 30 pounds of nitrogen, 160 pounds of 30% superphosphate, and 100 pounds of muriate of potash are used, and only the source of nitrogen is varied. In 1931, the superphosphate was decreased from 600 pounds 16% to 160 pounds 30%, and the potash was increased to 100 pounds.

The average results from a 5 year period indicate in most cases that on an acid soil a physiologically acid fertilizer is not near as effective as a basic nitrogen fertilizer. In the order of their cost efficiency, the nitrogen fertilizers rank in the order given, commencing with the highest, nitrate of soda, ⅔ nitrogen from nitrate of soda and ⅓ from ammonium sulphate; nitrate of soda potash; calcium nitrate, ½ nitrogen from nitrate of soda and ½ from cotton seed meal; calurea; ammophos; cyanamid; calnitro; leunasalpeter; urea; and sulphate of ammonia. The tests on calurea and calnitro cover only a period of 2 years.

Newer Sources of Nitrogen—Owing to the addition of several new sources of nitrogen fertilizers on the market, another experiment was started in 1929 to test the newer sources in comparison with the old established form. In this test, ammoniated phosphate, ammophos 13-48, synthetic nitrate of soda, ammonium nitrate and nitrate of potash are compared with Chilean nitrate of soda as a standard. Thirty pounds of nitrogen with 48 pounds of phosphorus from superphosphate and 100 pounds of potash from muriate of potash were the basic amounts of fertilizer ingredients used in the experiment.

On a profit basis, the average results from 2 years indicate the following rank of the nitrogen materials: nitrate of potash, synthetic nitrate of soda, ammonium nitrate, Chilean nitrate of soda, ammoniated superphosphate, and ammophos 13-48.

Source of Phosphorus Test—The object of the experiment was to determine the most efficient source of phosphorus for cotton production. The amount and ratio of plant food were kept constant, being 600 pounds of a 5-8-5, and only the source of phosphorus was varied. The nitrogen was furnished as nitrate of soda and the potash as muriate of potash. The results for one year indicate that citratus and superphosphate have about the same value. The order of efficiency of the others was as follows: Ruhm's lime phosphate, colloidal phosphate, raw rock phosphate, and basic slag.

Home-Mixed Versus Factory-Mixed and High Analysis Fertilizers—In 1929 an experiment for studying the efficiency of high analysis, factory-mixed, and home-mixed fertilizers was iniated. The amount and ratio of plant food were kept constant except in Nitrophoska No. 2 where the phosphorus and potash are in variance with the selected amounts, 30 pounds of nitrogen, 60 pounds of phosphorus, and 30 pounds of potash. The materials studied were Nitrophoska No. 1, Nitrophoska No. 2, factory- mixed 5-10-5, and home-mixed 5-10-5. In the home-mixed fertilizer, nitrate of soda, superphosphate, and muriate of potash were used.

The results from 2 years indicate that the Nitrophoska No. 2 gave the largest profit, followed rather closely by home-mixed fertilizer. The Nitrophoska No. 1 showed a smaller profit.

High Analysis Cotton Fertilizer Test—The high analysis fertilizer test was started in 1929 in cooperation with the DuPont Ammonia Corporation, Wilmington, Delaware. Owing to the severe potash starvation, no reliable results were obtained in 1929. In 1930, the land in the experimental field was taken over by the State Highway Department for highway experimental purposes after the cotton had been planted. It is planned to continue this work in 1932.

General Fertilizer Experiments at Main Station, Sub-Stations and Outfield Stations—The purpose of the general fertilizer tests is to determine the ratio and amount of plant food most profitable for the production of cotton and corn on the major agricultural soils of the State of Louisiana. In all tests, the nitrogen is derived from nitrate of soda, phosphoric acid and from superphosphate, and potash from muriate of potash. The basic fertilizer used is 5-8-4 based on a 600-pound application, except as noted.

The most profitable combinations of the various tests are as follows:

Location	Soil Type	Crop	Most Profitable Combination of Plant Food Element based on 600-lb. Application
Baton Rouge, La.	Mississippi River alluvial soil..	Cotton.	7-4- 0
St. Joseph, La....	Mississippi River alluvial soil..	Cotton.	7-8- 2
Raceland, La. ...	Mississippi River alluvial soil..	Corn...	5-0- 0
Thibodaux, La. ..	Mississippi River alluvial soil..	Corn...	5-0- 4
Monroe, La.	Coastal Plain alluvial soil......	Cotton..	7-4- 8
Melrose, La.	Red River alluvial soil.........	Cotton..	7-0- 6
Dixie, La.	Red River alluvial soil.........	Cotton..	5-0- 0
Baton Rouge, La.*	Olivier silt loam................	Cotton..	6-4-12
Baton Rouge, La..	Lintonia silt loam..............	Corn...	7-0- 0
Gilbert, La.......	Lintonia silt loam..............	Cotton..	6-4- 6
Sunset, La.	Olivier silt loam................	Cotton..	5-8- 8
Hammond, La....	Caddo very fine sandy loam....	Cotton..	5-8- 8
DeRidder, La.....	Ruston fine sandy loam........	Cotton..	4-8- 8
Homer, La.......	Ruston sandy loam.............	Cotton..	5-4- 6
Calhoun, La......	Ruston sandy loam.............	Cotton..	7-8- 8
Calhoun, La......	Ruston sandy loam.............	Corn...	4-0- 0

*Basic fertilizer changed from 5-8-4 to 5-8-8 in 1931.

Place Effects of Fertilizers on Corn—This work was started in 1929 in cooperation with a committee representing the American Society of Agronomy and the National Fertilizer Association. The object of the experiment is to obtain preliminary information on the most desirable depth and placement of fertilizer with reference to seed. It includes a study as to what extent climate and soil enter into the problem.

The local results indicate that the 250-pound application of a 4-10-6 fertilizer gave the highest yield of corn and that it was most efficient when the fertilizer is placed in hill in two parallel bands, 1½″ wide, 10″ long, 2½″ apart, ¾″ above seed level, and seed planted midway between bands. The national results have not been published.

Rate of Potash Fertilization—A comprehensive study of the rate of potash fertilization is being conducted on the major soil types of the state of Louisiana. This project includes work on time and method of application of potash.

Each test included 6 plats of 4 series. The amount of nitrogen and phosphorus was kept constant and the rate of potash varied from 0 to 8% with 2% intermediate increments. The basic amount of fertilizer used was 600 pounds of a 5-8-0 mixture in all places except Crowley and Lacassine, where a 5-12-0 mixture was used. In the case of the 8% potash a comparison was made between bedding on before planting and side dressing at first cultivation.

Owing to the high fertility of the test field, no significant results were obtained at Calhoun and Mer Rouge.

At Homer, owing to the dry weather, only small gains were obtained from each additional increment of potash. Eight per cent potash gave the highest yield. There was no apparent advantage from side-dressing at first cultivation.

At St. Joseph, the 4% potash gave the highest yield, and the results from side-dressing seem to be somewhat better than from bedding on just before planting.

The test at Baton Rouge showed significant increases in yield of cotton from each increment of potash used. There was no apparent advantage from side-dressing.

At Crowley, the 6% potash gave the highest yield, and again there was no advantage gained from side-dressing.

The largest benefits from potash fertilization were obtained at Lacassine. Even the 8% potash fertilizer did not entirely prevent rust. Owing to the dry weather, side-dressing was not as efficient.

PLACE EFFECT OF FERTILIZERS ON COTTON

Meyer-Barr

In 1930, the Louisiana Experiment Station began to cooperate with the Bureau of Agricutlural Engineering and the Bureau of Chemistry and Soils of the United States Department of Agriculture and with a joint committee on Fertilizer Application in a study of mechanical application of fertilizers to cotton. The work is conducted on Lintonia silt loam, Baton Rouge, Louisiana. The object of the experiment is to determine the best depth and placement of fertilizer with reference to the seed. The fertilizer was placed by a mechanical distributor developed by the Bureau of Agricultural Engineering.

Owing to the inclement weather the early part of April, an unsatisactory expected stand was obtained. However, the results gave certain indication which may be of value with the accumulation of additional data.

CHILEAN NITRATE OF SODA FERTILIZER EXPERIMENTS

Mitchell

The purpose of the nitrate of soda experiments was to determine the most profitable rate, time, and place of applying nitrate of soda to cotton, corn, and oats.

The most profitable rates of applying nitrate of soda for the production of cotton and corn are given in this report under the discussion of fertilizer results at the main station, substations, and outfield work.

Results of tests on the place of applying fertilizer to cotton show that nitrate of soda bedded on two weeks before planting gave the best yields at Delhi and Calhoun. Nitrate of soda bedded on at planting gave the best results at St. Joseph and Natchitoches, while side-dressing at planting gave the best yields on bench land at Baton Rouge. On alluvial soil at Baton Rouge, side-dressing at chopping gave the most desirable results. On Olivier silt loam soil at Sunset, the highest yield was received when 50 pounds were bedded on at planting and 150 pounds applied as a side-dressing at chopping out.

Results on the time of applying nitrate of soda to corn give the highest yields on the alluvial soil at Baton Rouge, St. Joseph, and Belcher when bedded on at planting. On Lintonia silt loam soil at Baton Rouge and Delhi, the best yields were received from the side-dressing when corn was knee high. The side-dressing of corn when waist high were the most profitable at Natchitoches, while at Sunset the application of the side-dressing when corn was bunching to tassel gave better yields. However, in the latter two cases very little rainfall was received and in no treatment was fertilizer profitable due to the extreme drought and consequent low yields.

Experiments show the most profitable rates to apply nitrate of soda to oats to be: 100 pounds at St. Joseph and Baton Rouge (bench soil); 200 pounds at Delhi, Calhoun, Natchitoches, and Baton Rouge (alluvial soil). At Sunset, the 400-pound application gave the best yield. These oats were pastured. This probably affected results.

The time of application of nitrate of soda to oats test shows the early application of February 1 to give the best yield at St. Joseph, the February 15 application to give the best results at Baton Rouge (alluvial soil), the March 1 application to give the best results at Delhi and Baton Rouge (bench soil), and the March 15 application to give the best results at Natchitoches, Calhoun, and Sunset.

SOILING CROPS

Meyer

Winter Cover Crops—Realizing the great economic importance of green manuring in enhancing the fertility of the soils in Louisiana, work along this line was started in 1928 by Dr. H. B. Brown on the main station and by Mr. C. B. Haddon of the Delta Experiment station, St. Joseph, Louisiana. In 1929, similar work was started by Mr. Sidney Stewart, North Louisiana Experiment Station, Calhoun, Louisiana.

The purpose of this work is to study the degree of soil improvement that can be obtained by turning under green manure crops. At Calhoun, the project was enlarged and made to include a study of lime and fertilizers for winter cover crops.

At the main station, Baton Rouge, Louisiana, oats, rye, Melilotus indica, vetch and Austrian winter peas were the cover crops turned under. A limed plat of Melilotus indica, a check and a plat with a treatment of 240 pounds of nitrate of soda were included. All plats had a basic application of 600 pounds of a 0-8-5 fertilizer bedded on in spring at time of turning under the cover crop.

The cover crops, save a fair stand of oats and rye, were a failure in 1929. In 1930, there was a heavy spring growth of all cover crops except of Melilotus indica on the unlimed plat. The heaviest yield was obtained from the Melilotus indica on the limed plat, being 12.9 tons of green matter.

Cotton was used as the experimental crop. From the rye and oats cover crop plats, an increase in yield of 113 pounds and 106 pounds, respectively, of seed cotton was obtained. The Melilotus indica limed plat gave an increase of 752 pounds of seed cotton; the Melilotus indica unlimed plat 538 pounds; the Austrian winter pea 704 pounds; the hairy vetch 839 pounds; and the nitrate of soda plat 443 pounds. The results of the study indicate that nitrate of soda is a more effective nitrogen fertilizer than rye and oats, but not nearly as effective as the accepted standard leguminous cover crops. The yield of the no cover crop was 1459 pounds.

At the Delta Experiment Station, no fertilizer was used except 150 pounds of nitrate of soda on one plat for comparison. Rye depressed the yield, but all leguminous cover crops with good stands gave an increase ranging from 647 to 1407 pounds increase of seed cotton over check of 1144 pounds. The increase from 150 pounds of nitrate of soda was only 363 pounds of seed cotton. Vetch gave the best account of itself in the test. The depression of rye on the yield of cotton was considerably less in 1931 than in 1930.

The basic fertilizer used at Calhoun was 600 pounds of a 0-8-5 fertilizer. Comparative studies of the value of applying fertilizer in fall just prior to the planting of the cover crop instead of prior to the cotton crop were made. The effects of lime and potash on the yield of the cover crop and cotton crop were observed.

As only one year's results are available, the 1931 results should not be taken as final. Fertilizer applied to the cover crop gave in every case a larger tonnage of green matter than where no fertilizer was added; though in spite of this fact the yield of cotton was higher where the fertilizer was applied just prior to the cotton. Lime increased the yield of the cover crop and the succeeding cotton crop over the unlimed plat. Potash applied in fall increased the yield of the cover crop, and the yield of cotton on that plat over that where the potash was applied in spring.

From the standpoint of nitrogen efficiency in the production of cotton, the cover crops on the limed plats were superior to that of 240 pounds of nitrate of soda. There was no significant difference between hairy vetch and Austrian winter peas, though a slightly higher yield, 32 pounds of seed cotton, was obtained from the former plat.

Effect of Date of Turning Under Soybeans on Yield of Corn—The object of the experiment was to ascertain the best time to turn under a crop of soybeans and corn planted together in rows. October 1st, December 1st, and March 1st were the dates tried. Corn was used as the measure crop.

There were no differences of yield of corn obtained as a result of the time of year of turning under the cover crop. There was a high rate of nitrification on all plats in the fall and during warm weather in the early winter. Later in the season, there was practically no nitrification on any plats which condition prevailed until about June

1st, and there actually appeared a condition of nitrogen starvation as evidenced by the appearance of the corn crop. The field and laboratory results indicate that a light application of nitrogen is necessary even though a cover crop as mentioned has been turned under. Indications also were that the later plowing was preferable from the standpoint of getting rid of winter weeds. Incidentally the test also showed that in the dry seasons, of 1929 and 1930, the planting of soybeans in the same rows with corn, reduced the yield of corn 71.1 and 56.8% respectively.

SOIL BACTERIOLOGY

Sturgis

The Effects of Additions of Nitrogen on the Decomposition of Sugar Cane Trash Under Field Conditions—Although legumes are being effectively employed in the maintenance of soil nitrogen in the cane belt the relatively high removal of nitrogen from the soil under the conditions that prevail in the growing of sugar cane makes desirable the use of all field residues of the crops for the support of the highest state of soil fertility. Sugar cane trash is material of a wide nitrogen-carbon ratio but due to the fact that a large yield per acre is produced a very appreciable amount of nitrogen can be returned to the soil directly through its use. Practical difficulties are met with in the utilization of sugar cane trash, for it is tough and bulky and commonly has to be plowed into the soil at that season of the year which is least conducive to rapid decomposition. The purpose of this experimental work has been to determine the conditions under which sugar cane trash can be used in conserving the soil nitrogen and organic matter without the lack of available nitrogen for crop growth ensuing from the excessive stimulation of soil micro-organisms.

The trash was applied to the soil, Sharkey silty clay loam, at the rate of 12 tons of moist field trash per acre and varying amounts of ammonium sulphate were added with it. The rates of decomposition were studied and the effects of the various treatments on the available and total nitrogen in the soil determined.

Trash that was chopped and mixed with the surface soil on March 10 caused a marked lowering of the nitrate nitrogen in the soil. The depressive effect lasted for three months. While trash that was applied in the same manner on October 27 had decomposed sufficiently by the following April to have ceased to lower the available soil nitrogen, both ammonia and nitrate. By the addition of inorganic nitrogen with the trash at the rate of five pounds of nitogen per ton of fresh trash and the incorporation of the mixture within the surface five inches of soil, the rate of decomposition was increased and the presence of available nitrogen insured. Since nitrate nitrogen disappears from the surface soil during winter and spring, an early application of the trash alone with the supplemental nitrogen being added directly ahead of the crop would prove the more practical method for the use of sugar cane trash. Application of the trash to the soil increased the soil nitrogen and organic matter. The gain in soil nitrogen from the use of the trash was, within the limit of experimental error, equivalent to the nitrogen content of the trash. The addition of nitrogen with the trash increased the yield of corn 19 per cent where the trash and fertilizer were put into furrows and completely covered but controlled results indicated that much higher results could be expected from an intimate mixture of the materials with the surface soil.

The resultant decomposition following from the application of the trash increased the availability of phosphorus during the earlier stages of decomposition.

A method for the determination of the carbohydrate material of the soil as reducing sugars was improved for this study and the disappearance of the carbohydrate fraction was found to serve well as a measure of the rate of decomposition of cane trash in the soil under field conditions.

The lignin fraction of cane trash undergoes slow decomposition and tends to accumulate in the soil when the trash is buried but when the trash is turned into the surface soil, there is no excessive accumulation from the lignin. True lignin of the plant material gradually changes to lignin-humus material in the soil. Lignin-humus decomposes much more rapidly in summer than in winter and spring.

CROPS WORK

COTTON INVESTIGATIONS

Brown

As mentioned in our previous report, much attention is being given to cotton breeding work looking toward the development of more satisfactory varieties for different sections of the State. Numerous individual plant selections and crosses are made and the new strains thus produced are tested in progeny rows, new strains tests, variety tests, etc. Rather extensive breeding work has been carried on at Baton Rouge on both Bench and Alluvial Land, at the St. Joseph Branch Experiment Station in cooperation with Mr. Haddon, and at the North Louisiana Branch Experiment Station in cooperation with Mr. Stewart. The best of our new strains and other prominent varieties have been further tested at nine Outfield Stations located in various parts of the State. Our strains have ranked high in these tests. In 1931 the leader and three of the five ranking varieties were our productions.

Delfos strains continue to give good returns in the Delta regions of northeast Louisiana and on all other alluvial land of the State except in certain areas where cotton wilt prevails. Delfos-531 made the best record in 1931. For the hill and prairie lands of the State, D. & P. L. No. 4-8, and No. 10 are good varieties. No. 10 which is a recent introduction made a splendid showing in 1931. It is somewhat earlier and more prolific than 4-8 but does not have as high lint percentage. Stoneville 2, and Stoneville 3, are

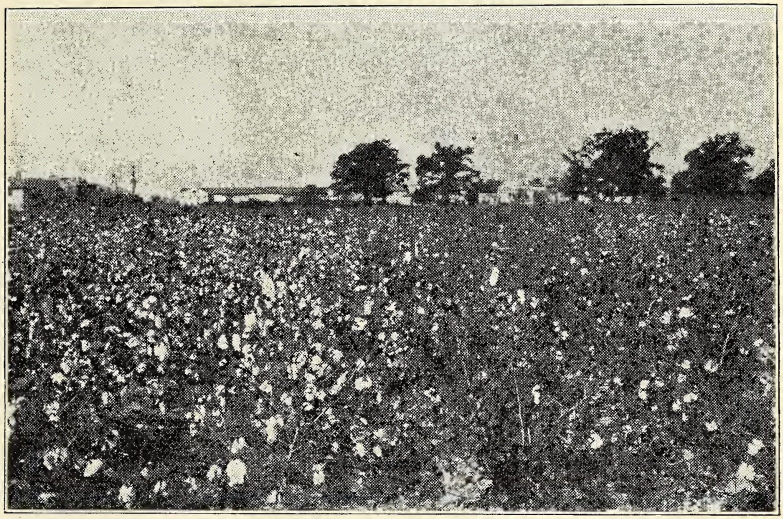

Fig. 2. Well adapted to local varieties in the left half of the picture and poorly adapted Texas varieties in the right.

good early prolific varieties of rather wide adaptation. Dixi-Triumph appears to be the most productive wilt resistant variety for Louisiana conditions.

Uniformity of staple length is a desirable quality in cotton. It has been thought that the present lack of uniformity may be due, in part at least, to the heterozygous condition of the plants grown. More uniformity may be attained by inbreeding. In 1928, an inbreeding experiment was started with eight varieties representing different types to see what effect inbreeding has on the growth and production of cotton plants. Three years inbreeding has had no decided effect.

A cotton date of planting experiment which has been conducted on the Bench land soil at Baton Rouge gives average yields of seed cotton as follows:—April 1, 1795 pounds; April 11, 1893 pounds; April 22, 1939 pounds; May 2, 2022 pounds; and May 11, 1832 pounds. Fungous diseases are worse on the earlier cotton and stands are poorer. Boll weevils are worse on later cotton but may be controlled with poison.

With rows four feet apart best yields were obtained, over a period of three years, on both Bench and Alluvial land at Baton Rouge, from a row spacing of two stalks per hill, in hills 20 inches apart.

Cotton root pruning by means of deep and medium cultivation retarded the growth of plants in height in 1931, but had no significant effect on yields. The average height of plants was as follows: After deep cultivation, 39.54 inches; medium cultivation, 30.57 inches; shallow cultivation, 32.19 inches.

An experiment to determine the relative effect of high and low bed cotton culture gave rather striking results in 1931. This was a moderately dry year at Baton Rouge. The cotton on the low bed rows was planted on beds approximately 4 inches high and given level cultivation. The high bed cotton was planted on beds approximately 12 inches high and cultivated during the season to keep the beds high. The plants on the high beds early began to appear more growthy than the others and on July 22 measurements showed them to be 3.39 inches taller on the average. Later the difference appeared to be greater. The low bed plants were earlier and appeared to have more rust. The low bed rows yielded 33.7% more cotton the first picking and 5.6% more for the year.

Studies of the root development of cotton plants showed that on the Bench land soils more than 90% of the roots were in the upper eight inches of soil and that rarely was there a tap root that penetrated the soil deeper than this. On the alluvial land soils, the tap roots regularly penetrated the soil to a depth of two feet or more and secondary roots were frequent in deeper layers of soil.

Ceresan dust well distributed over cotton seed at a rate of 3 ounces to a bushel of seed increased the germination 20.2%, and decreased the number of diseased plants by 51.1%. The increase in yield was insignificant.

CORN INVESTIGATIONS

CORN BREEDING

Stoneberg-Brown

The corn breeding work in cooperation with the U. S. Department of Agriculture consists of (1) making selections in and maintaining selfed lines from several varieties; (2) making single, double, and other crosses involving the selfed lines; and (3) testing the crosses for yield and quality in comparison with the best local variety. Of 113 crosses tested in 1931 (selfed lines from Cocke's Prolific crossed with the open fertilized parent variety), 50 yielded more, 50 less and 13 yielded the same as the check. The three highest yielding crosses produced yields 31, 36, and 37 per cent above the check.

Another line of corn breeding work underway is the development of a high yielding, weevil resistant variety of yellow corn. Crosses have been made between Cocke's Prolific, our best white variety, and Yellow Creole, Hill's Yellow, and Clovelly Yellow. The hybrid strains produce well and have good quality, but are not yet pure yellow.

Mass selection work is being carried on with Cocke's Prolific corn in an effort to increase its weevil resistance and make the type more uniform.

Corn variety tests were conducted in thirteen different parts of the State in 1931. The prolific varieties made the best yields in most areas. Cocke's Prolific had the highest ranking in the statewide tests. Hill's Yellow Dent and Clovelly Yellow ranked high in the southern part of the State. Sentell's White Dent is a good one-ear variety for the northern part of the State.

CORN CULTURE

Brown-Gray

In 1929, an experiment was started to test the comparative effect of level and ridged cultivation on corn production on Bench land soil. The corn was planted on a low bed in one case and on a 12-inch bed in the other and cultivated to maintain the high bed. The plants on the high beds appeared to make more growth during the season and were larger at harvest. The ears from the high bed rows appeared to be larger. Two of the years the experiment has been run were comparatively dry and the other seasonable. The yields of the high bed rows have been greater every year the experiment has been run. The three year average for the low bed rows has ben 38.6 bushls per acre while that of the high beds has been 43.1 bushels.

In an experiment to test the effect of soybeans in the row of corn on the yields of present and succeeding crops, the beans reduced corn yields 23.6% the first year; reduced yields 46.9% the second year which was a dry year; and increased yields 12.7% the third year.

In an experiment to test the production of hay, in case of soybeans, and grain, in case of corn, when the two were planted in the same and in alternate rows, the alternate row plats yielded 36.6 bushels grain per acre, and 6371 pounds of hay in 1929, and every row plats yielded 40.7 bushels of corn and 6044 pounds of hay. In 1930, a dry year, the alternate row plats led in production of corn by a 20.7% margin and also made slightly more hay. In 1931, the every row plats led in yields by a small margin. From results thus far, it appears that the every row planting gives best results.

In an experiment to test the effect of different rates of soybean seeding in corn rows at planting time, Otootan soybeans were planted at the rate of 20, 30, and 40 pounds per acre. From a three year average it appeared that the different rates of seeding mentioned had but little effect on the weight of corn stover or grain produced but did have effect on the weight of soybean hay. The heaviest seeding gave the greatest production of hay.

In a corn spacing test on Bench land in 1931, with soybeans in the corn row, a spacing of 1.16 ft. gave a yield of 38.2 bushels per acre; 2.30 ft., 31.0 bushels; 2.93 ft., 28.6 bushels; 3.39 ft., 26.4 bushels.

On Alluvial land, a three-year average of the results from the different spacings was as follows:

1 foot	43.6 bushels per acre
2 feet	39.1 bushels per acre
3 feet	36.4 bushels per acre
4 feet	32.8 bushels per acre

The rows were 4 feet wide in both experiments.

Seed corn dusted with semesan dust at a rate of 2 ounces per bushel increased the field germination 9.73%. An extra amount of seed was planted, and consequently, after the corn was thinned all rows had near the same number of stalks. No gains in yield were obtained from the treatment.

SOYBEAN INVESTIGATIONS

Gray

Louisiana climate is adapted to the production of late maturing soybean varieties, having a possible growing season of approximately 200 days. The long growing season permits a larger yield of hay. While the main soybean crop may be composed of the later maturing varieties, yet there is a place for the earlier varieties in sections of the State where an early pasture or hay crop is needed or as a crop following oats. The great variation in maturity of the different varieties or that which results from the planting of the same variety at different dates makes it possible to have a succession of forage throughout the summer and fall.

The soybean is a versatile crop widely adapted to various conditions and in Louisiana must utilize labor at a time when it is not needed for other crops. It is one of the most dependable crops known. The chief objection to the soybean for hay is that it has rather coarse, woody stems. This may be partially overcome by giving proper attention to the time of harvesting, heavier rates of seeding, and by growing a good forage variety.

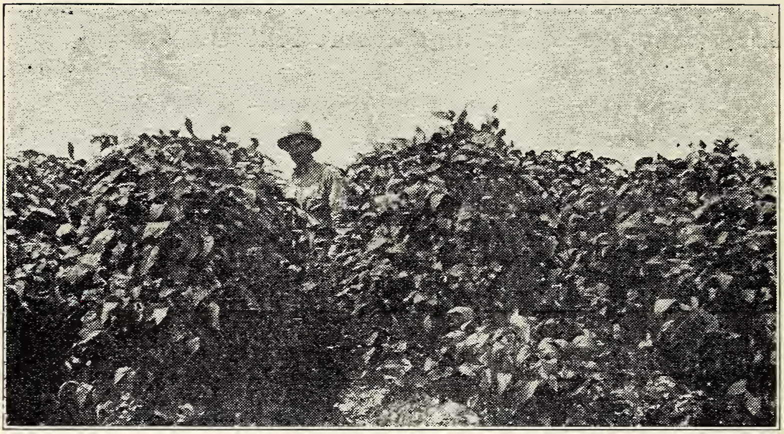

FIG. 3. Soybeans make splendid growth in Louisiana.

Soybean Breeding—Individual plant selections and crosses are being made each year and the progeny studied in plant-to-row plats. Promising strains are added to the field tests and some are being increased for distribution to farmers. Considerable work has been done in a correlation and inheritance study of some of the morphological characters of soybean plants which will be reported later.

Soybean Variety Studies—Variety tests with soybeans have been conducted at Baton Rouge since 1920 and over the State since the Outfield tests were established in 1929. The late maturing varieties led in the yield of hay over the State the past 3 years, with Otootan, Louisiana Selections 60 and 20—and Biloxi being consistently high; followed by Tanloxi, Laredo, Mammoth Yellow, and the earlier varieties, Haberlandt and George Washington. Several U. S. Strains were also high at Baton Rouge.

Soybean Culture—In response to frequent inquiries concerning the growing of soybeans in Louisiana, definite experiments are in progress to obtain data regarding the date, rate, and method of seeding this crop and some of the effects of the different treatments upon the yield and quality of the hay and seed. In all the experiments, 2 and 3 row plats, 100 feet long were grown in 4 series.

Date of Seeding—Biloxi and Biloxi Hybrid-60 soybeans were planted at intervals of 3 weeks from March 17 to August 10. The difference in the yield of cured hay was not great between the different dates to and including June 8 for both varieties; however, the maximum yield for the B. H. 60 was produced from the June 8th planting. A fair yield of hay and seed was produced from the June 29th planting. The plants seeded August 10th yielded a small amount of seed by the latter part of November.

Rate of Seeding—Two standard varieties, the Biloxi and Otootan, were grown in seven rates of seeding beginning with 5 pounds, 10 pounds, and with increasing intervals of 10 pounds to and including 60 pounds per acre. There was a continued increase in the yield per acre of cured Biloxi hay from 4057 pounds for the 5 pound rate to 5746 pounds for the 30 pound rate, although the yield of the 20 pound rate was almost as high as the heavier seedings. The 20 pound rate seemed sufficient for seed production. With the Otootan, there was little apparent difference in the yield of cured hay or seed per acre above the 10 pound rate.

The number of branches per plant and the diameter of the stalks decreased with the heavier rates of seeding. The diameter of the stalks from the 60 pound rate was approximately a third that of the 5 pound rate for both varieties, while the number of branches per plant was about half. Stalks with smaller diameters produce hay with finer stems. A thick, woody stalk, difficult to cure is one objection to the Biloxi and other upright growing varieties. Since an upright growing variety facilitates the use of modern harvesting machinery, this objection may be partially overcome by heavier rates of seeding.

Method of Seeding—Otootan soybeans were grown in rows varying in width from 8 feet to 1 foot, with an adjoining plat sown broadcast. There was a continued increase in yield per acre of cured hay from 3363 pounds for the 8 foot row to 6863 pounds for the 1 foot row and 5745 for the broadcast plat. There was, likewise, a similar increase in the yield of beans per acre.

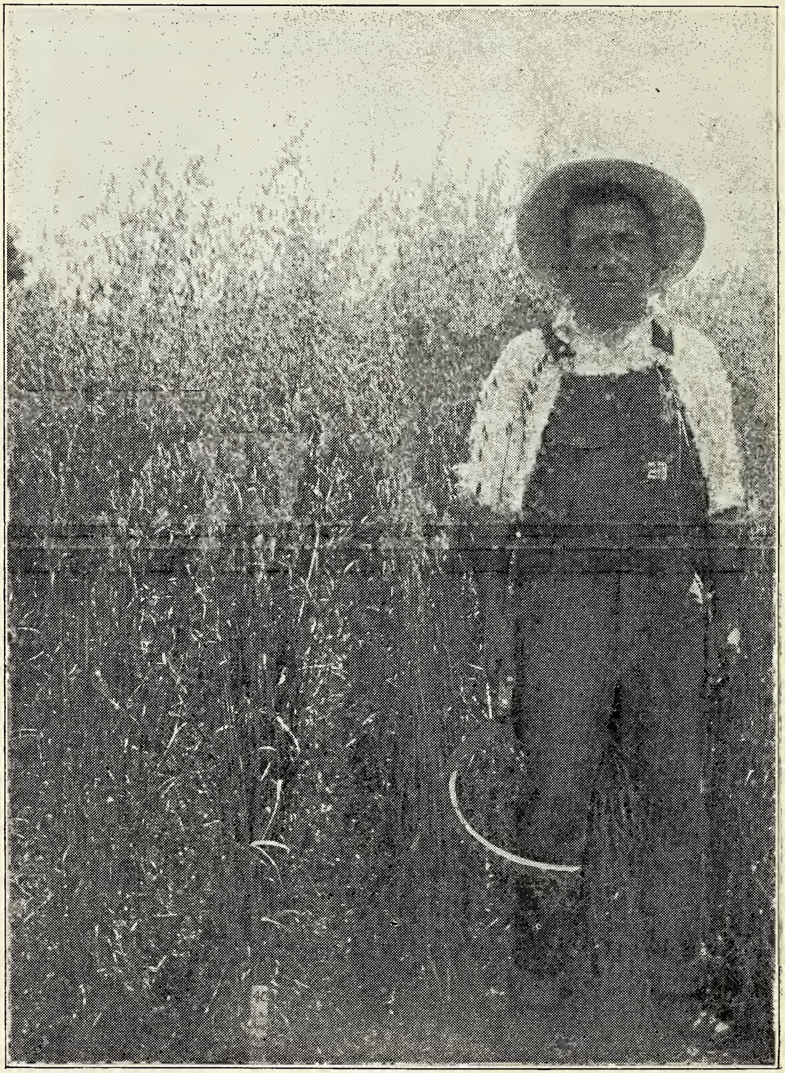

Fig. 4. Louisiana Red Rust Proof oats that yielded 84 bushels per acre.

Since many farmers in Louisiana use the 4 foot rows, a comparison was made on the basis of the rows 4 feet apart. In considering the yield of hay, the 3 foot row produced 111% of the 4 foot rows; the 2 foot rows 133%; the 1 foot rows 138%; the broadcast plats 115%; the 6 foot rows 86%; and the 8 foot rows 68%. As would be expected, the number of branches per plant and the diameter of the stalks decreased with the narrower rows and in the broadcast plats.

In considering the different methods of seeding soybeans, the additional amount of seed required for the closer spaced rows and in sowing broadcast should not be overlooked. Broadcast sowings and 1 foot rows tend to result in increased competition of weeds in wet seasons and a decreased yield of hay and seed during dry years. There will also be more labor required in cultivating soybeans grown in rows as compared with the broadcast method, but this is usually justified by increased yields with less weeds. Where closer spacing is desired the 2 foot row is recommended. It permits some cultivation and the close spacing results in favorable yields of fine stemmed hay.

OAT INVESTIGATIONS

Gray

Oat production in Louisiana is handicapped by winter killing on occasionally severe winters and by damage from crown rust injury. Oat breeding work has been confined to a study of the yielding ability, disease resistance, winter hardiness, and other factors of economic importance in oat production in order to find varieties best adapted to Louisiana conditions. Cooperation is given the U. S. Department of Agriculture in conducting a uniform rust nursery and winter hardiness nurseries in Louisiana.

Oat Variety Tests—Oat variety tests were conducted at St. Joseph, Calhoun, and Baton Rouge for the purpose of securing information concerning the varieties best adapted to Louisiana conditions. These tests were conducted in cooperation with those in charge of the branch stations.

The past season was almost ideal for oat production; the winter was mild and no varieties winterkilled. There was practically no injury from crown rust at St. Joseph and not over 30% at Calhoun, while at Baton Rouge the injury ranged from 1 to 5% for the rustproof varieties to 70 or 80% for the susceptible varieties. Therefore, susceptible varieties probably ranked higher at St. Joseph and Calhoun than would be expected with the normal rust infestation together with more severe winter growing conditions.

All seed was treated for smut and sowing was done October 10-15 inclusive.

The leading varieties were strains of the red rustproof oats, including Louisiana and Texas Red Rustproof, Appler, Fulghum, Nortex, 100-Bushel, and Ferguson 922.

Oats should be sown early with a drill if possible on a well prepared seedbed. The seed should be treated for smut.

GENERAL FORAGE CROP INVESTIGATIONS

Gray

The Louisiana climate lends itself beautifully to forage crop production over a large portion of the State. Lespedeza, white clover, and some grasses provide an abundance of pasture and hay as well as a profitable seed crop. However, there are periods and areas over which the ample annual rainfall is not evenly distributed. Droughts during the critical growing period when rain is most essential occasionally cut the yield of corn severely, thus forcing the farmer to seek other feed crops. This has resulted in an increased demand for information concerning grain sorghums and other substitute or catch crops.

Grain Sorghums—Experiments have been conducted with grain sorghums and sorgos at the Calhoun, St. Joseph, and Baton Rouge Experiment Stations in cooperation with those in charge of the stations. Variety tests, date of planting, and midge damage were some of the problems studied. This work will be continued. Highest yields of forage and seed were made from sagrain, kafir, feterita, and hegari, and seeded ribbon and sumac of the sorgos.

It would seem that grain sorghum may be planted from April to July with fair yields, therefore adapting itself particularly during years when prospects for corn production are poor as a catch crop or for general planting as a forage crop.

At Baton Rouge two crops of forage and grain were produced when planted April 9, 1931. Soybeans were planted in the same row and the crop was harvested with a corn binder. Grain sorghum stubble grown in 1930 survived the winter and produced a good crop of forage and seed in 1931 at Baton Rouge.

Alfalfa—Lime was found to be the limiting factor in alfalfa production in a lime and phosphate experiment conducted at Baton Rouge on bluff soils. All plats not having lime added died after the first cutting although some received an application of 250 pounds and 500 pounds of superphosphate. Creditable gains were made from superphosphate when lime was added.

Three cuttings were secured. Ground oyster shell was added in amounts of 3000 pounds to 12000 pounds per acre in 1/25 acre plats in 2 series. Superphosphate was added in 250 pound and 500 pound rates. Oyster shell alone produced a gain of from 3,583 pounds of cured hay for the 3,000 pound rate to 4,345 pounds for the 6,000 pound, and 4,765 pounds for the 9,000 pound applications.

250 pounds of the superphosphate added to the 3,000 pound application of oyster shell produced 3,986 pounds of cured hay per acre or a gain of 403 pounds. 500 pounds of superphosphate increased the yield to 4,191 pounds or a gain of 608 pounds. 250 pounds of superphosphate added to the 6,000 pound application of oyster shell produced a yield of 4,634 pounds or a gain of 289 pounds; while 331

pounds were gained from the 500 pounds of superphosphate added. No gains were shown from the superphosphate applications with the 9,000 pound and 12,000 pound rates of oyster shell.

Crotalaria, Beggar Weed, Velvet Beans, and Teosinte—In a miscellaneous group of legumes and grasses, 6 species of crotalaria produced from 10 tons to 15.6 tons of green forage as compared to 15.7 tons of velvet beans, 16.5 tons of beggar weed, and 17.6 tons of teosinte. Crotalaria may have merit as a green manure crop in areas not adapted to soybeans, clover or other legumes, since most species are not palatable to livestock. It would seem that there are many other legumes that might be grown for green manure and utilized for hay and grazing instead should occasion demand.

Clovers and Grasses—Experiments are being conducted with clovers and grasses to obtain information concerning their possibilities in Louisiana. Results of this work will be reported later.

Sugar Beet Investigations

Brown

The prevalence of sclerotial root rot seems to be the chief limiting factor to sugar beet growing in southern Louisiana. At present an attempt is being made to develop strains of beets that have some resistance to the disease. Selections of apparently healthy roots made in a field of beets in which most of the roots were diseased have not given satisfactory results due partly to the fact the mother beets selected have failed to produce seed after transplanting. It has been found that by planting in September or early October that about 30% of the beets produce flower stalks the following spring. A limited amount of good seed has been obtained from some of these plants.

OUTFIELD EXPERIMENTS

Cotton

Outfield experiments in Louisiana were established in order to gain reliable information regarding the performance of varieties and field crops, and their fertilizer requirements when grown on the various soil types and under the different climatic conditions of various parts of the state. Practices successful in some sections often prove a failure in other regions.

Experiments including variety tests with cotton, corn and soybeans and fertilizer tests with cotton were carried on at nine different places in the state in 1930 and 1931. Some twenty varieties of cotton, twelve varieties of corn, ten varieties of soybeans and sixteen different rates of applying fertilizer were studied.

These tests were conducted at the following locations:

Gilbert, Louisiana, located on Macon Ridge soil, very similar to the bench land at Baton Rouge. The rainfall here is several inches less per year than in the southern part of the state.

Monroe, Louisiana, located on the Ouchita Valley alluvial land of moderate fertility with about the same rainfall as Gilbert.

Homer, Louisiana, located on North Louisiana hill land somewhat above the average in fertility for its type. The rainfall is slightly lower than at Monroe and Gilbert.

Dixie, Louisiana, located on Red River alluvial land well adapted to cotton, and of rather high fertility; rainfall about the same as Monroe.

Melrose, Louisiana, located on Red River alluvial land in a large cotton growing district where the soil is about the same as at Dixie, but rainfall is slightly heavier.

DeRidder, Louisiana, located on Western Louisiana hill land very similar to Homer. The growing season here is slightly longer and rainfall heavier than that of Homer.

Sunset, Louisiana, located on Prairie soil of rather higher fertility than most soils of this type in the state. The rainfall is about the same as Baton Rouge and 6 or 8 inches more than North Louisiana stations.

Hammond, Louisiana, located on southeast Louisiana pine plats of rather low fertility and difficult to drain. The rainfall is possibly a little higher than at Baton Rouge.

Thibodaux, Louisiana, located on bayou LaFourche alluvial land in the sugar cane section. The soil is rather fertile and the rainfall is 8 or 10 inches more per year than North Louisiana.

The same type of experiments are carried on at three of the branch stations in conjunction with their regular program. At the Rice Experiment Station, Crowley, Louisiana, J. M. Jenkins, superintendent, located on prairie soil of south Louisiana, of moderate fertility; at the Delta Experiment Station, St. Joseph, Louisiana, C. B. Haddon, superintendent, located on Mississippi River alluvial land of high fertility; at the North Louisiana Experiment Station, Calhoun, Louisiana, Sidney Stewart, superintendent, located on North Louisiana hill land of average fertility for this type of soil. The rainfall at Calhoun and St. Joseph is some 4 to 8 inches less than at Crowley, and the growing season 10 to 20 days shorter.

FELLOWSHIPS

Two fellowships, Chilean Nitrate and N. V. Potash Export. My., Inc., were made available to the Agronomy Department of the Louisiana Agricultural Experiment Station since the last biennial report. The Chilean nitrate work was started in the fall of 1929 and terminated January 1, 1932. The potash fellowship was started May 1, 1931 and is still being continued.

The purpose of these fellowships is to furnish funds for the expansion of experimental work in soil fertility.

AGRICULTURAL ECONOMICS

FINANCING PRODUCTION AND MARKETING OF LOUISIANA STRAWBERRIES AND SUGGESTED REORGANIZATION

Thompson

This study was confined to the strawberry area of the Florida Parishes in Louisiana and had for its purpose the assembling and analyzing of data pertaining to organization, production credit and marketing the strawberry crop for the season 1929-1930 and the development of a more efficient organization for handling the industry.

Louisiana Bulletin Number 219, published in January, 1931, contains the results of this study. A brief historical sketch of the strawberry industry is presented emphasizing changes in production, yields, prices and organization, and comparisons are made with competing areas. An analysis is made of the factors influencing prices paid from day to day and prices received by farmers at different shipping points at given periods of time. These factors include such items as time and method of picking and handling the berries, type of car used, inspection, refrigeration, method of selling and the like.

Attention is given to economies that might be had in better methods of buying supplies, such as fertilizer, crates and other major items used on the farm.

General Conclusions:

(1) There are too many local associations in the berry area, and these are costing the farmers out of proportion to the services rendered.

(2) Farmers are paying prices for marketing service, mercantile service and credit service out of line with the income and services they receive.

(3) Many dollars can be saved through efficient cooperative action in securing credits and purchasing major farm supplies, as fertilizer, crates and feed for cash.

(4) The present system of handling the berry crop is not conducive to large gains for any of the agencies involved. A change in this method will not affect adversely the profits of those engaged in handling the crop, but a change for the better, after adjustments are made will be beneficial to merchants, bankers, and all who depend on the berry industry for an existance.

(5) There is sufficient evidence to show that the type of car in which berries are loaded reflects itself in the prices paid. These inferior cars should be relegated to the trash heap, or placed in freight service where more durable commodities are hauled.

(6) There are no substantiating facts that will lead to the conclusion that buyers voluntarily control the price of berries on the Hammond Auction.

(7) There is not that high correlation as some suspect, between the type of car and the claims that come back on the Auction. However, there appears to be some relationship. Further study on this particular point is necessary before definite conclusions can be reached.

Recommendations:

(1) A consolidation of all existing associations at each of the shipping points, or a complete reorganization, with one strong local cooperative association at each of the main shipping points is desirable. At those points near each other where insufficient berries are produced to load in car lot consistently, one association could serve two or more of these points. One label or trade mark to be adopted for each shipping point, to keep down mixed loading. To keep down duplication of effort and reduce expenses of operation to a minimum, but maintaining the maximum efficiency is of prime importance in any industry.

(2) To organize a central selling organization cooperative in nature and made up of local cooperative associations.

(3) To locate this central organization in Hammond, and equip its offices with modern bookkeeping machinery, where the accounting for the entire organization, including locals, can be centralized and efficiently done.

(4) A sales manager be employed and placed in charge of the central organization. This manager to have had successful experience in the berry business and should be the best that money can buy.

(5) The central organization to maintain a Credit Corporation, capitalized at such a rate that a line of credit of $3,000,000 can be obtained if found necessary.

(6) This credit corporation to be managed by a hired manager to be selected on the basis of business ability and banking experience.

(7) The central organization to maintain a purchasing department, through which all crates, hampers, fertilizer, and feed can be obtained. This department will make it possible to utilize hired management and clerical forces more efficiently.

(8) Every transaction to be put on a cash basis this to be made possible through the proper functioning of the Credit Corporation.

A suggested outline for reorganizing the berry industry is given in the appendix of this publication.

OPERATION OF THE GENERAL PROPERTY TAX IN LOUISIANA IN ITS RELATION TO AGRICULTURE

Thompson

This project was outlined in February, 1931, the Division of Agricultural Finance, Bureau of Agricultural Economics cooperating. The purposes of this project are to determine:

(1) The change in general property taxes during the past two decades, with special reference to agricultural taxation.

(2) The ratio of farm taxes to farm incomes.

(3) The equality of assessment as between (a) large and small farm and city properties (b) individual farm properties within given sized groups, (c) farm properties and other types of properties such as industrial, residential and forest properties.

(4) The distribution of the tax burden as between the various occupational groups, and different classes of property.

(5) Possibilities of tax revision that will meet the growing demands for revenue and at the same time will not increase the burden for the already heavily taxed groups.

This study is under way at the present time and has not developed to the point that definite conclusions can be stated.

PROJECTS

Saville

During the biennial, two projects have been in process, namely: Purnell projects 256 and 257. Project 256 was completed in one year and Project 257 was continued for a period of two years.

Project 256: "Recent developments of Farm Power Utilization on Louisiana Rice Farms." This project has been completed and report published in Louisiana Agricultural Experiment Station Bulletins 216 and 218.

Bulletin 216. Rice Farm Irrigation Work in Louisiana in 1929, by R. J. Saville

This report contains analyses and tables showing the significant factors in the costs of operating and acres of rice flooded for 42 Diesel engines and 18 electric motors used in irrigating rice in 1929. Data presented consist of the operating and overhead outlays per acre and the acres of rice flooded by make, age and rating of engines or motors used. The significant finding is in the relation of the type and size of plant to the volume of flooding to be done. As the acreage to be flooded increases, Diesel engines become more advantageous and electric motors less desirable. This is due chiefly to the behavior of overhead costs and certain non-varying current expense items connected with the operation of Diesel engines. Installation of Diesel engines requires a high initial outlay and operation makes a fixed amount of man labor necessary. These charges when distributed over a large acreage become very low, but on small acreages are almost prohibitive. Electric motors have a low installation outlay and require little or no labor for operation. Their cost is largely a cost for energy used. As the acreage of rice to be flooded increases, costs increase almost as rapidly. For Diesel engine operation variations in the cost were found to be from $10.38 per acre of farms having one hundred to two hundred acres of rice, to $6.50 for farms operating over 300 acres of rice.

Bulletin 218. Tractors and Trucks of Louisiana Rice Farms, 1929, by R. J. Saville and G. H. Reuss

Saville

This bulletin contains analyses and tables showing important factors in the economical use of tractors, and trucks on rice farms in 1929. Data are presented showing the distribution of tractors by ages and makes, according to the acres of rice operated. The John Deere and McCormick-Deering tractors comprise 63% of the tractors found on these farms.

The important feature is the adjustment between the volume of work to be done by a tractor and the kind of tractor used. Tractors spend 61% of their time in the preparation of rice land for seeding, 25% of the time is employed in cutting and thrashing rice. Tractors were used less than 2% for crops other than rice. On the average, tractors replace about two men and eight mules per farm. The outlay and accomplishment for tractors are presented for the important makes. The average hours per tractor for the two important makes of tractors was 650 per year. The costs of operation were $7.82 per day for McCormick-Deering 10-20; $8.64 for John Deere 15-27; and $10.51 for McCormick-Deering 15-30. In order to obtain low cost performance, farmers must get a large acreage per tractor. This enables the overhead costs of depreciation and interest to be distributed over a large acreage and large usage.

Sixty-one per cent of the farmers owned a truck. The chief usage consists of hauling fuel oil, seed rice, fertilizer, and marketing rice. Hauling to market amounts to over 65% of the time put in on rice, hauling fuel oil 17%, and fertilizer and seed 18%. It was found that the average annual outlay for motor truck operation exclusive of the driver varied from $198.00 on farms having 100 acres of rice or less, to $289.00 on farms having over 300 acres of rice. On the competitive basis it appeared that hauling over 2,100 bags of rice at customs rates is necessary to equal annual outlay for motor truck operation. Two-thirds of the total outlay is for current operation expenses.

In the use of work stock, 90% of the rice farmers purchased feed. The outlay for purchased feed averaged about $30.00 per head, and home-grown feeds at $8.00 per head. Depreciation was less than $10.00 per head. For farms operating without a tractor, investment and depreciation per head were increased materially and the acres of rice per farm and per head were far below average. The hours per head of work stock for rice alone were about 400 per year. Work stock utilization is a comparatively insignificant factor in the operation of rice farms where the acreage is sufficient to permit ownership of a tractor.

Economies in man labor are possible as the acreage of rice is increased. Important savings appear in the requirements for pump operation, levee construction and supervision, and in land preparation. The introduction of the tractors rather than the use of work stock permits the greatest saving in man labor.

HISTORICAL AND STATISTICAL STUDY OF LOUISIANA TRADE CENTERS FROM 1901 TO 1931

Smith

The purpose of this study is to discover as far as possible the factors which account for the growth and development of some trade centers and the decline of others. Special consideration is to be given to the study of the influence of certain features of the social structure upon the rise and decline of trade centers. In other words, are certain features characteristic of the centers which grow and others of these which go back, and if so what are these features? Closely allied to this is the determination of what sizes and types of centers are consistently successful in offering each of the types of service.

Up to date several parts of the work have been completed.

(1). A classification of all types of service found in these trade centers, as listed in Bradstreet's Books of Commercial Credit Ratings has been worked out.

(2). For the years 1901, 1906, 1911, 1916, 1921, 1926 and 1931 all the services listed in Bradstreet's have been classified according to this scheme, for every hamlet, village, town and city in Louisiana.

(3). These data have been punched on Hollerith cards and are now ready for analysis.

I. Farm Power Study:

Reuss

A study of power costs and use on sugar cane farms for the year 1929 was carried on in the spring of 1930. Seventy-four farms were surveyed on the details of power and labor requirements and upon the expenditures for mule and tractor use.

Labor and power requirements varied but little between small and large farms. However, the variation between farms was largely due to differences in soil type, plantation layout, and individual managerial ability. Under the prevailing system of cane and corn both labor and power distributions showed high requirements in the spring and fall with a low summer and winter needs. The use of tractors offered a means of leveling somewhat the spring peak of requirements, but their usefulness was much limited by their apparent inability to greatly decrease the need for mule power in harvest and by the fact that no one type of tractor fitted well into both land preparation and cultivation needs. The operation of small tractors cost $7.90 per day and the straddle-row or 15-30 size required outlays averaging $11.27.

Cane plantation mules were fed in 1929 at a cost $154.00 per head. Other outlays brought the total cost to $209.53 per year. Mules on tractor farms were maintained at somewhat lower cost. This decrease together with the replacement of mules showed a slightly smaller total power cost for farms using tractors and mules than for farms using mules only. This difference did not exist on all farms nor is it large enough to be considered as conclusive.

A detailed report on this study giving labor and power requirements for the various crops, feed fed workstock, itemized statements of power costs has been published as Louisiana Bulletin No. 215, "An Economic Study of Factors Affecting Farm Organization and Power Utilization of Sugar Cane Farms, 1929."

II. The Organization and Returns of Small-Sized Cane Farms:

Louisiana Bulletin No. 224, "The Organization and Financial Returns of 129 Small-Sized Louisiana Cane Farms, 1930," published July, 1931 presents the results of a study of the effects of farm organization factors on income.

The farms studied averaged 163 acres in size of which 97 were in crops. Investments average $95.37 per acre of crop land. Crop sales accounted for most of the cash income received, however, livestock particularly cattle and hogs returned a small cash income in addition to produce for home consumption. Cane occupied 39.1 per cent of the crop land, corn 45.2 per cent, and cotton 9.8 per cent. The greatest concentration of cotton was found in the Teche and Western sections, while cane specialization was more common on the River. Truck crops were grown on the river and in smaller amounts on the Teche. Crop yields were as follows: Cane 14.7 tons, corn 17.6 bushels, cotton 670 pounds of seed cotton, and sweet potatoes 20 barrels.

Seventy-one per cent of the farms studied made some net cash income. The average for all farms was $4.38 per crop acre or $426 per farm. Thirty per cent made more than enough net cash income to pay depreciation, family labor, and interest on invested capital. However, on the average all farms lacked $4.50 per acre or $438 per farm of returning enough to pay these charges.

The following factors were correlated with net returns: Size of farm, proportion of cotton, truck crops, and cane, labor expense, and cane yields.

The size of farm did not markedly affect the net income per acre, but brought out the effect of other factors when considered on a per farm basis. The range of profit and loss increased directly as the size of farm.

Cotton included in the organization to any considerable proportion of the crop area was associated with a decrease in both net cash income and labor income.

Farms on the Eastern area which grew truck crops on a commercial scale or relied upon these as a sole source of cash income made relatively high net cash returns per acre, but due to this small size were very low when considered on the farm basis. Truck growing was associated with large amounts of family labor which in most instances did not return prevailing wage rates through its use in the production of these crops.

Labor income and cash income increased as the proportion of cane was increased up to approximately fifty per cent of the crop area. After this point was reached, labor and feed expenses rose more than proportionately to gross income.

Labor expense per acre and crop acres per man as associated with income both indicate that labor efficiency is an important factor in determining profits. Excessive use of labor is the most pronounced cause of labor inefficiency although there is a tendency on some farms to over economize on the use of labor. The excessive supply of labor was, in most cases, the result of lack of adjustment between the size of farm or the crop organization and the available supply of unpaid labor.

Of the factors studied, the yield of cane was the most important in the determination of income.

III. Cane Harvesting Costs:

A detailed record of the harvest operations of three plantations was carried on in the fall of 1931. The analysis of these records will have as its object to determine the influence of (1) the variety of cane, (2) the straightness of the cane, (3) the yield, (4) the weather and road condition, (5) the type of equipment, (6) the balance of equipment and labor, and (7) the length of haul on the cost and rate of harvesting cane.

IV. Financial Records on Cane Farms:

Beginning in January, 1932, approximately forty financial records will be inaugurated on farms of the cane belt.

The records will be used to study the operation and organization of small to medium-sized farms and promising practices and types of organization.

V. Articles Written on Economies of Sugar Cane Growing:

A. Operation of Field Cane Loaders in Louisiana—The Sugar Bulletin, November 1, 1930—Page 10.

During 1929 the cost of loading cane by using mule drawn power operated loaders was 13.3 cents per ton of which 11.7 cents were cash charges and 1.6 cents overhead expenses. Costs varied with the amount of cane loaded per day and with the number of days used per season. This variation was from 22.5 cents per ton for the high cost group of farms to 9.4 cents on the low cost group. The first group averaged sixty-two tons per day for thirty-nine working days and the second 155 tons for sixty-seven days. Costs for loader operation on farms having less than 175 acres of cane, or approximately 3500 tons, were without exception higher than hand loading outlays.

B. The Use of Motor Trucks in Hauling Cane—The Sugar Bulletin, August 1, 1931—Page 1.

Motor trucks both custom and owned have recently come to play a part in cane harvest operations. These trucks compete with the railways for hauls of from three to twelve or fifteen miles and are also used to replace carts on road hauls of two to five miles. Custom truck rates have been somewhat under rail rates for the distances at which trucks compete and when the hauling can be done on gravel or paved roads. Hoisting charges are also sometimes reduced by the use of custom trucks. Although no accurate cost data are presented, it is the belief of plantation managers that truck charges plus an additional hoisting charge are less per ton than cart costs for hauls of two to five miles on gravel roads. A study of owned trucks studied indicates that a considerable margin exists between the actual cost of truck operation and the custom rate in effect. The elapsed time between the loading of the cane and its grinding is less under trucking methods than by rail shipment.

Technical difficulties in design and size of body, etc., are being rapidly overcome and with the economies obtained trucks bid well to occupy an important position in cane harvesting.

C. Sugar Cane Harvesting Methods and Costs—The Sugar Bulletin, August 15, 1931.—Page 1.

This article discusses the custom method of cutting cane as compared with the older labor methods. Custom cutting has several advantages. Less supervision is required, fewer cutters are normally needed, inefficient cutters are easily eliminated, and on the farms studied the cash expense for labor was slightly decreased over that on plantations using day labor. Day labor for cutting cane preparatory to burning was somewhat lower than were custom rates for the same operations although the above advantages probably about equalize the total cost.

COTTON PRICE QUALITY RELATIONSHIPS IN LOCAL MARKETS OF LOUISIANA

Farrington

Note: The collection and tabulation of data for this study were conducted by the Division of cotton marketing, Bureau of Agricultural Economics in Cooperation with the Louisiana Agricultural Experiment Station.

Purpose of Study:

1. To determine the extent to which prices paid to farmers in local markets for cotton varied with length of staple.

2. To determine the relationship between premiums and discount for staple length on local markets and in central markets.

3. To determine the extent to which prices paid to farmers in local markets for cotton varied with grade.

4. To determine the relationship between grade differences in local and in central markets.

5. To determine the relationship between the average prices in local markets and in central markets.

6. To determine insofar as possible the factors affecting each of the above.

This study included ten local markets in Louisiana. These markets were selected to represent the various types of local markets existing in the State during 1928-29. These markets, each possessing certain special characteristics, were classified into two general groups, each containing five markets. These are designated as commission markets, and merchant markets. Each of the five markets in the general groups was designated by letter, and studied individually. Representative samples were collected from these various markets and the purposes of the project were effected.

Conclusions:

About 30 per cent of the central market premiums and discounts for staple lengths other than seven-eighths inch were reflected in prices received by farmers in the 10 local markets of Louisiana studied. The extent to which premiums and discounts for staple length were received by farmers differed considerably in the various local markets and types of local markets. Staple length was recognized to a considerable degree in the commission-buyer markets as a whole and especially in those in which the influence of ginner buying was absent. For all of the commission markets combined central market price differences were received by farmers to the extent of about 50 per cent.

Among the five merchant markets the data for only two of the competitive merchant markets, indicate positive reflection of central market premiums and discounts for staple length to any extent, whatsoever. The average percentage for these two markets was about 10. In the noncompetitive merchant markets, there seems to have been a total disregard of staple premiums and discounts, with farmers receiving approximately the same price for 13/16 inch cotton as for cotton with staple length of 1-3/16 inches.

Grade differences were received by farmers in the ten local markets studied to a slightly greater extent than were staple premiums and discounts. However, based on the grade designations of government cotton classers, only about one-third of the central market premiums and discount for grade were received by farmers in the market studied.

The average spread or difference between central market prices and corresponding local market prices, adjusted for differences in freight, and compressing charges, was considerably greater for merchant markets than for commission markets. This spread was greatest for the noncompetitive merchant markets and smallest for the nonginner commission markets. The adjusted spread was $2.20 per bale for all local markets, $1.95 per bale for all commission markets, and $2.95 for all merchant markets.

Adjusted local market prices for 13/16 inch cotton averaged $2.00 per bale above central market prices. The average adjusted prices paid to farmers for each of the other staple lengths were below corresponding central market prices, the amount per bale being for 7/8 inch; $1.40 for 15/16 inch; $2.95 for 1 inch; $5.70 for 1 and 1/16 inches; $6.25 for 1 and 1/8 inches and $8.90 for 1 and 3/16 inches.

A direct relationship was noted between the average spread between local and central market prices and the average staple length of cotton produced. This relationship indicates that, although communities which produced longer staple cotton received somewhat higher actual prices than other communities, the superior quality of the cotton was not fully reflected in average prices paid.

The seasonal change in the spread between local and central market prices was notably different in commission markets and merchant markets. For the commission markets this spread was relatively narrow during the middle of the season and was wider at the beginning and end of the season—especially the latter. This change seems quite natural inasmuch as during the height of the season when buyers were receiving a large volume of business they could operate on a narrower basis than toward the beginning or end of the season when only a few bales were being marketed. For the merchant markets the spread was very wide at the beginning of the season and became narrower as the season advanced. This seasonal change was accounted for, largely, by the decrease in the average length of staple in these markets as the season advanced.

Marketing facilities available in local markets were found to have an appreciable influence on average local market prices. The least spread between central market prices and local market prices was for the two markets at which a warehouse was available and cotton was hauled direct from the gin to the warehouse, and then sold on warehouse weights and samples.

The average loss or gain in weight of cotton bales affects the prices paid for cotton. Some buyers reported no average loss in weight, while others reported an average loss of as much as 10 pounds per bale. Data secured at one market showed an average loss of nearly 6 pounds per bale between the gin weight on which the cotton was purchased and the weight on which it was sold by the buyers.

An analysis of the individual transactions in certain local markets on one day revealed the fact that in the commission markets there were numerous inconsistencies and irregularities in the prices received by farmers when these prices were classified according to the grade and staple length designations of government classers. In many cases, farmers received the same price for cotton called a short staple length as for cotton called a longer staple length. There was, usually, a wide range in the prices received for cotton all designated as the same grade and same staple length. Such inconsistencies were largely accounted for in Market A, however, by similar inconsistencies in the grade and staple length designations of government classers and of local buyers. In the merchant markets analyzed, the farmers received about the same price for every bale regardless of its quality or any other consideration, and the level of prices was generally lower in the merchant markets.

A definite tendency on the part of the local buyers to call practically all of the cotton as one, two, or three of the middle grades and staple lengths was apparent. On the other hand, the government classers usually made a more or less normal distribution of the cotton throughout the range of grades and staple lengths.

It seems apparent from this study that the type-of-buyers and the degree of competition in a market are very important factors with respect to price quality relationships and average price levels, and that comparability and uniformity of cotton classing are prerequisities for an accurate reflection of quality values to farmers.

CREEP-FEEDING OF BEEF CALVES

Bray

Creep-feeding experiments with grade-beef calves were conducted in 1930 and 1931. In 1931, ten calves were fed 99 days on a ration of ground ear corn, cottonseed meal, blackstrap molasses, and rice bran, (average ration 2.0 lbs. daily). These calves ran with the cows on pasture, and received feed once daily, the creep or pen being near the water trough where the calves could go in readily. These gained 1.96 lbs. per day and were valued at $6.27 per 100 lbs. at the close of the test. Ten calves equal in weight and type, running with their dams on pasture, with no extra feed, gained 1.52 lbs. per day. These were valued at $5.44 per 100 lbs. at the close of the test. Final average weights and values were as follows: Lot I, creep-fed, 493.5 lbs., value $30.95. Lot II, (check), 450.4 lbs., value $24.49, cost of feed per head, $2.45, balance in favor of Lot I, $4.01.

In the 1930 test, 120 days on feed, the weights and gains were as follows: Lot I, creep-fed, gain per day, 1.83 lbs., final weight, 476.3 lbs., appraised value, $8.37 per 100 lbs. Lot II, (check) gain per day, 1.44 lbs., final weight, 421.7 lbs., appraised value, $7.45 per 100 lbs. The margin of profit was only $2.41 in favor of creep feeding due to high feed costs. The creep-feeding of calves may not prove especially profitable where they are on excellent pasture, especially if the cows are good milkers, and feeds must be purchased at retail prices. Where the conditions are reversed, with pastures short, and the calves not growing well, a substantial increase in value may be obtained from extra feeding. Where it is convenient to do the feeding, and the feed is grown on the farm, this appears to be one of the most economical methods of producing beef.

Brahman vs. Beef-Type Sires

Bray

A summary of three years' observations on calves sired by a Brahman bull compared to beef type bulls shows a consistently higher rate of growth in favor of the Brahman cross.

In 1931 eleven calves by a Brahman sire averaged 418 lbs. on September 3, as compared to 347 lbs. for 24 calves by beef-type sires. Gains on the Brahman half-bloods were 2.12 lbs. per day from birth, as compared to 1.72 lbs. for the other calves. The average weight on heifers retained for the herd was 500 lbs. and 451 lbs. respectively, on November 3, but this included only three Brahman half-bloods. Yearling heifers by the Brahman sire averaged 1.11 lbs. gain per day from birth to October 3, 1931, as compared to 1.00 lbs. per day for heifers of similar age by beef-type sires, average weights being 736 lbs. and 670 lbs. respectfully. Weights on dry two-year old heifers, November 4, 1931, were 1083 lbs. and 980 lbs. respectively. These results should be considered as applying only in the coastal plains area.

PASTURE FOR BEEF PRODUCTION

Bray

To determine the beef produced per acre on alluvial land in Louisiana, a record was kept on the gains of yearling and two year old steers and yearling heifers on two different fields. Field 2, an improved pasture, containing 26.5 acres, produced 373.5 lbs. of grain per acre from March 23 to October 13, 1931 (332 lbs. to September 12), or an average of 255 lbs. per head. This field which was seeded to white Dutch clover in February, 1929, following a cultivated crop, has now an excellent stand of white clover and Bermuda. Grazing capacity was 38.8 cattle (averaging 500 to 700 lbs.), or 1.47 head per acre. Gains on Field 2 averaged 1.5 lbs. per day to August 3, and .83 lb. after that date.

Field No. 15, an unimproved field of 22.8 acres, containing some clover and Bermuda with coarse grasses and weeds, produced 69 lbs. of grains per acre to September 13, and carried an average of 13 head of cattle, making an average daily gain of .83 lbs. per day. Enough grazing remained to maintain cattle in good condition after that date, but gains had practically ended by September 13.

Field 15 has been divided into two equal parts, and one part disced and seeded to clover and improved pasture grasses. The remaining half will be allowed to develop naturally into white clover and Bermuda grass, with no other attention than mowing and drainage. The beef production on the two areas will be measured over a series of years.

SUMMER FATTENING OF STEERS ON PASTURE, GRAIN ON GRASS, COMPARED TO GRASS ONLY

Bray

The two experiments covered by this report were similar to those conducted in 1928 and 1929, a comparison of feeding concentrates along with grass, as compared to grass alone for fattening steers, but in this test, only half the grass-fed steers were to be marketed with the grain-fed steers in midsummer; the others being grazed until the end of the season.

The cattle in the 1930 test were high grade Herefords, with a few grade Aberdeen Angus, averaging 480 lbs. Estimated value at start of experiment $9.00 per cwt.

Extremely dry weather in early summer reduced gains, and resulted in some states in numbers of half-fat cattle being thrown on the market in July, causing a rapid decline in prices. The only cattle to break even in this test were those carried on grass until Nov. 1. Grains and prices were as follows: Lot I, grain fed, 148 days, gain 292 lbs., 1.97 lbs. per day, sale price, $7.91. Lot II-A, grass only, 148 days, gain 156.6 lbs., 1.06 lbs. per day, sale price, $6.64, per cwt. Lot II-B, grass only, 226 days, gain 284 lbs., 1.25 lbs. per day, sale price, $6.62 per cwt. Grain feed per 100 lbs. gain, (Lot I) was 254.5 lbs. corn, 80.3 lbs. cottonseed meal. Profit or loss on the three lots, per head: Lot I, $4.92 loss, Lot II-A, $6.62 loss, Lot II-B, $0.82 gain. Average profits for the two preceding years were $11.81 for the fed cattle and $5.52 on grass alone.

In 1931, there was an abundance of good pasture throughout the alluvial section, and cattle made excellent gains without extra feed. Daily gains and prices on the three groups in 1931 were as follows: Lot I, 9 steers, (grain fed), 2.01 lbs., average selling price, July 12, $6.92 per cwt., apparent profit, $4.13 (apparent profit not including rent of land). Lot II-A, 3 steers, (grass only), gain, 1.99 lbs. per day, average selling price, $6.60, apparent profit, $6.42, sold at same time as Lot I. Lot II-B, 4 steers, (grass only), sold October 17, 1931, gain, 1.37 lbs. per day, average selling price, $4.83 per 100 lbs., loss, $5.48.

Bloating was more severe than usual in 1931, and three steers in Lot II died from this cause. If this loss was charged against the remaining seven steers in this lot, Lot II would show a heavy loss instead of a profit. No serious bloating occurred in the steers receiving grain in Lot I. Lot I ate 134 lbs. of concentrates for each 100 lbs. gains.

HOGGING DOWN CORN

Bray

One comparison was made between dry-lot feeding and hogging down corn and soybeans on a field of 2.6 acres. Corn hogged down in the field gave a slightly more economical and efficient return for feed consumed. The crop was grown on light bench land and at least one-third of the area was damaged by drought. The yield was estimated from sample rows to equal 21.25 bushels per acre. On this basis, hogging down saved 58 lbs. of feed per 100 lbs pork, as compared to dry lot feeding, in addition to saving of labor and retention of fertility of the land. Gains per day were: 1.19 lbs. per day in the dry lot and 1.18 lbs. in the field. Gains per acre, 368 lbs. Value at six cents per pound, $22.08. Cost of supplementary feed, $4.22 per acre. Net value, $17.86 per acre. Calculated on the basis of feed replaced, as compared to the dry lot, one acre replaced $15.37 worth of feeds at market prices, including corn at 56c per bushel.

SWEET POTATOES FOR FATTENING SWINE

Bray

Tests on sweet potatoes in 1931 included two lots fed in the field, one with sweet potatoes fed with corn in dry lot, and one lot fed corn in dry lot as a check. A protein supplement of equal parts of shrimp bran and cottonseed meal was supplied to each lot in self feeders. A white sweet potato, containing more starch and less sugar than the Porto Rico yams, appeared slightly superior to the Porto Ricos. Although the daily gains were equal on each field, the white variety appeared to require less potatoes per 100 lbs. gain. Gains per day were as follows: Check lot. (Lot I), 1.9 lbs. Cost per 100 lbs. gain, $4.24, Lot II, corn and potatoes in dry lot, 2.0 lbs. per day. Lot III, white sweet potatoes in field, 1.61 lbs. per day. Lot IV, Porto Rico Yams, 1.62 lbs. per day. Credit for each 100 lbs. potatoes: Lot II, fed in dry lot, 31.5c, Lot III, 19.8c, Lot IV, 17.5c. Credit per acre of potatoes on basis of corn at 56c per bushel: Lot III, white variety, $21.00, Lot IV, Porto Ricos, $19.51, after paying for all supplementary feed. It is evident that a greater value was returned per 100 lbs. of potatoes when fed in combination with a small amount of corn than when fed without corn in the field; both lots receiving protein supplements. Whether this will prove equally true in field tests will be determined in 1932 experiments. Compared to check rations of corn and protein supplements fed in dry lots, three years of experiments with sweet potatoes show values in different combinations as follows: Sweet potatoes alone, without supplement (2 trials, 9.4c per 100 lbs). Sweet potatoes, with protein supplement (3 trials, 17.4c per 100 lbs.) Sweet potatoes with corn and protein supplement (1 trial, 38.9c per 100 lbs.)

PROTEIN SUPPLEMENTS FOR SWINE

Bray

Dehydrated shrimp bran is a by-product of the shrimp canning industry, consisting of the heads and hulls of green shrimp, dried and ground into meal. Shrimp bran has proved to be superior to digester tankage as a supplement either with corn alone, or with corn and rice polish rations for fattening swine, where corn forms approximately three-fourths of the ration. Shrimp bran and cottonseed meal (equal parts) proved superior to shrimp bran alone, and tankage and cottonseed meal superior to tankage alone. The supplements, when self fed with shelled corn, ranked as follows: (considering average gains per day and feed per 100 lbs. gain) Shrimp bran-cottonseed meal, gain per day, 1.51 lbs., feed per 100 lbs. gain, corn, 270.7 lbs., supplement, 55.2 lbs. Tankage-cottonseed meal, gain, per day, 1.43 lbs., feed per 100 lbs. gain, corn, 285.4 lbs, supplement 56.0 lbs. Shrimp bran only, 1.42 lbs. gain per day, feed per 100 lbs. gain, corn, 306.4 lbs., supplement, 41.15 lbs. Tankage only, gain per day, 1.09 lbs., feed per 100 lbs. gain corn, 363.5, supplement, 43.5.

In the 1931 feeding test, with rice polish as the only basal feed for 70 days, the addition of cottonseed meal to either shrimp bran or tankage reduced gains and increased feed requirements. When corn replaced 75% or more of the rice polish, the cottonseed meal mixtures again proved superior to either shrimp bran or tankage alone.

PASTURE CROPS FOR SWINE

Bray

Comarisons were made on two pastures crops in 1931; sudan-grass and rape, and soybeans. Nine-tenths of an acre of sudan-grass and Dwarf Essex rape pastured 30 pigs for 66 days (May 31-August 3). The pigs on pasture required 124.3 lbs. less feed for each 100 lbs. pork produced than did a similar group fed in a dry lot. On this basis, an acre of this pasture was equal to 2,372 lbs. feed worth $30.93. An acre of soybeans pastured after August 3 furnished pasture for 15 pigs for 43 days (Lot III) and saved $3.27 on each 100 lbs. pork produced, or $22.15 per acre. Lot III was fed at a later date than the other two lots, with some change in ration, so that the results are only comparable in a general sense. The pigs were of similar type and size.

Comparisons are being made on winter oats and rape, and melilotus indica for winter pasturage. Experiments will be continued during 1932 on sudan-grass and rape, soybeans and white Dutch clover.

Observations have been made during two years on the effects of various rations and pastures, and the use of codliver oil and ultra-violet light treatment of sows, on the condition of pigs at farrowing, particularly in regard to weakness of legs and swollen joints in the young pigs at birth. No conclusive results have been obtained. Codliver oil appeared to give positive results in the 1931 test, but was entirely negative in 1930. The percentage of pigs dead at birth was greater in three lots receiving codliver oil (17.2%) as compared to 10.9% for all other lots. The living pigs from the three lots were graded slightly higher in condition and vigor than in two check lots receiving no codliver oil. No difference could be observed due to the type of pasture. Sows treated with ultra-violet light, but receiving no codliver oil farrowed 100% living pigs. Differences in breed type and size of litters tend to obscure any other effects which might have been present. Rations containing 15% protein supplement were not noticeably superior to rations with smaller amounts. All sows received simple mineral mixtures of bone meal, ground oyster shell, and salt. Since the sows were the property of the University, no abnormal rations were fed.

BLACKSTRAP MOLASSES FOR FARM WORK MULES

Snell

Blackstrap molasses is a by-product of the sugar refinery and is produced in rather large quantities in the sugar cane area of southern Louisiana. It is commonly fed to livestock, and is usually low in price. Corn, which is the chief carbonaceous concentrate fed to mules on sugar plantations, would not be grown provided a satisfactory substitute could be found. Consequently, a feeding experiment with work mules was started in May, 1929, the objects being (1) to determine the feeding value of blackstrap molasses in comparison with corn, and (2) to find the extent to which blackstrap could replace corn grain in the work mule's ration. Seven teams, later six, were divided into two lots. The basal ration consisted of ground whole ear corn and hay. Blackstrap replaced corn grain pound for pound at the rate of 3 pounds in Lot I and 6 pounds in Lot II. After 252 days, the molasses levels were raised to 6 and 9 pounds respectively and continued for 266 days. After 126 days in each feeding trial the lots were revised in order to eliminate any variation due to individuality of the mules.

On the ration containing 3 pounds of molasses, the mules gained an average of 4.01 pounds; their mates receiving 6 pounds of molasses daily lost 13.38 pounds. During the second trial, the mules receiving 6 pounds of blackstrap gained 52.05 pounds, their mates on 9 pounds of molasses gained 56.44 pounds. The differences in gains of the mules during either period are statistically insignificant, therefore it is concluded that cane molasses has a feeding value for farm work mules equivalent to that of corn grain pound for pound. It is furthermore concluded that as much as 9 pounds of blackstrap can be included in the daily ration of a farm work mule with good results.

When corn is selling at 20c, 30c, 40c, 50, 60c, 70c, 80c, 90c, or $1.00 per bushel, blackstrap molasses has the following values per gallon as a feed for farm work mules, 4.18c, 6.27c, 8.36c, 10.45c, 12.54c, 14.63c, 16.72c, 18.80c, and 20.88c.

BLACKSTRAP MOLASSES AND CORN-SOYBEAN SILAGE FOR FATTENING YEARLING STEERS

Snell

In the fall of 1929, a dry lot feeding project with yearling beef steers was started, the object being the determination of the feeding value of molasses and the effect of its inclusion in rations with and without silage. The rations were as follows: Lot I—ground whole ear corn, cottonseed meal, hay, and salt, Lot II was fed the same as Lot I, except that blackstrap molasses (2.2 pounds) replaced corn grain pound for pound, Lot III was fed the same as Lot I, except corn-soybean silage was full fed in addition to the ground whole ear corn, cottonseed meal and hay, Lot IV was fed the same as Lot III, except that molasses (2.2 pounds) was fed so as to replace corn grain, pound for pound.

This work was repeated during the year 1930-31, with the exception that a mineral mixture composed of bone meal, 40 parts, ground oyster shell, 40 parts, and salt, 20 parts, was self-fed to all lots.

The average daily gains were 1.96, 1.93, 1.94, and 1.97 pounds, respectively, for the four lots. The feed required for 100 pounds of gain was: Lot I, ground whole ear corn, 542 pounds, cottonseed meal, 104 pounds, hay 281 pounds; Lot II, ground whole ear corn, 400 pounds, molasses, 112 pounds, hay, 317 pounds; Lot III, ground whole ear corn, 529 pounds, cottonseed meal, 106 pounds, hay, 157 pounds, silage, 241 pounds; Lot IV, ground whole ear corn, 392 pounds, molasses, 109 pounds, cottonseed meal, 104 pounds, hay, 201 pounds, and silage, 306 pounds. In Lot I, the ground whole ear corn group, 100 pounds of ground whole ear corn plus 2 pounds of cottonseed meal was equivalent to 112 pounds of molasses plus 36 pounds of hay. In Lot III, the ground whole ear corn—silage group, 100 pounds of ground whole ear corn was equivalent to 114 pounds of molasses, 46 pounds of hay and 68 pounds of silage. On a dollar and cents basis, molasses was worth about ⅓ less than corn grain.

THE EFFECT OF THE ADDITION OF VARYING AMOUNTS OF BLACKSTRAP MOLASSES UPON THE DIGESTIBILITY OF THE VARIOUS NUTRIENTS

Snell

Blackstrap molasses when included in the rations of fattening steers has given variable results. In some experiments, its feeding value has been equivalent to corn grain pound for pound; in at least, one feeding trial its feeding value has been negative. The question naturally arises as to the effect of the addition of varying amounts of blackstrap molasses upon the digestibility of the various nutrients.

Three yearling steers were used for these trials, each digestion period consisting of a 10-day preliminary period followed by a 10-day digestion period proper.

The basal ration fed in the first trial consisted of 8 parts ground whole ear corn, 2 pounds of cottonseed meal, and 3.5 pounds of grass hay; the ingredients being coarsely ground and mixed. In the succeeding trials, molasses replaced ground whole ear corn at the rates of 15 per cent, 30 per cent, 45 per cent, and 100 per cent of the grain content, one pound of molasses replacing one pound of corn grain plus its cob and shuck.

The digestibility percentages for the five trials in order are as follows: protein, 54.03, 66.26, 48.31, 48.25, and 47.68; ether extract 76.03, 77.94, 77.56, 75.77, and 67.45; nitrogen free extract, 59 65, 67.75, 72.22, 73.62, and 71.35; fiber, 27.18, 21.57, 31.91, 35.57, and 29.37; ash 35.70, 54.89, 63.42, 68.06, and 70.87.

The addition of molasses showed a slight depressing effect upon the digestibility of protein, but seemed to increase the digestibility of the fiber and ash.

The Digestibility of Artificially Dried Soybean Hay as Compared to Sun Dried Soybean Hay

Snell

The drying of fresh cut hay, or desiccating hay, as it is sometimes called, by means of hot air currents is of importance in Louisiana. A machine for this work has been developed by the Louisiana Agricultural Experiment Station. Some question has been raised as to the feeding value of this hay in comparison with hay cured by ordinary field method. A digestion trial was carried on with soybean hays in order to answer this question, three yearling steers being the experimental animals.

In the fall of 1930, one plot of Biloxi soybeans was cut and cured in the usual field method, another of the same variety and treatment was cut and the fresh green hay run through the desiccator and the water content reduced to approximately 14 per cent or less. The analyses, coefficients of digestibility and the digestible nutrients in 100 pounds of the two hays are shown.

	Protein	Ether Extract	N. F. E.	Fiber	Ash
ANALYSES, PER CENT					
Field cured	9.13	.80	29.77	47.30	7.15
Desiccated	12.13	2.45	36.72	32.00	8.40
DIGESTIBILITY COEFFICIENTS					
Field Cure	61.43	40.83	53.01	55.25	58.85
Desiccated	51.28	66.72	62.28	41.63	37.04
DIGESTIBLE NUTRIENTS PER 100 POUNDS					
Field cured	5.60	.32	15.78	26.13	4.21
Desiccated	6.22	1.63	22.87	13.32	3.11

Drying reduced the digestibility of the protein, fiber, and ash, but increased the digestibility of the ether extract and nitrogen free extract.

Spring Lamb Production

Snell

Thirty-eight native white-faced ewes were purchased locally and brought to the University during the first week of March, 1930. These were wormed and divided into two lots, Lot I being bred to a purebred Southdown ram and Lot II to a purebred Hampshire ram. The Southdown lambs averaged 7.3 pounds at birth, and the Hampshires 8.0. The average length at birth of the Southdown lambs was 20.84 inches, and that of the Hampshires 22.29. The heart girth of the Southdown lambs was 14.25 inches while that of the Hampshires was 14.35. These differences were still present at an average of 95 days of age. At this time, the Southdown lambs averaged 47 pounds, and the Hampshires 50 pounds. The Southdown lambs averaged 38 inches in length and 27 inches around the heart while the Hampshire figures for these measurements were 39 and 28 inches, respectively. The estimated net income per lamb was $1.29 for the Southdown grades, and $1.52 for the Hampshires.

EFFECT OF PLANE OF NUTRITION UPON WOOL PRODUCTION AND REPRODUCTION OF EWES

Snell

One of the problems of the wool grower in the cut-over areas of Louisiana is the shedding of wool by the sheep in the winter and spring months. This shedding seemed to be of a nutritional origin. In order to test this theory, forty native ewes were divided into four groups of ten head each, and placed in dry lot. The rations fed are as follows: Lot I, full fed, Lot II, full fed eight months, one-third full fed for four months, Lot III, two-thirds full fed, and Lot IV, one-third full fed. Wool samples are to be taken every 121 days, and the length, crimp and diameter of fiber studied.

In order to start this project, a sheep shed with feed room, the two totaling 100 x 16 feet, was built. Adjoining dog-proof dry lots were also constructed.

The first 112 days, results showed growth of the wool to be 3.75, 3.95, 3.20, and 2.75 centimeters for Lots I, II, III, and IV, respectively. The average diameters of fiber in ten-thousands of an inch were 10.36, 10.27, 9.52, and 9.50, respectively. The average crimps per inch were 6.79, 6.80, 7.43, and 7.93.

On January 22, Lot I had produced 2 lambs, Lot II, 2 lambs, Lot III, 5 lambs, and Lot IV, 4 lambs. Three of the lambs in Lot IV died within a few days after birth, apparently because their mothers had no milk.

PARTIAL SURVEY OF WOOL PRODUCTION IN LOUISIANA

Snell

In the spring of 1931, a partial survey of wool production of Louisiana was attempted. A total of 737 fleeces were weighed, a sample of shoulder wool was obtained and a scouring test was run on this sample in order to determine the shrinkage. The results may be summarized briefly as follows:

1. The native piney woods ewe shears about 2.4 pounds of wool, 2.76 inches (7.00 c.m.) in length and shrinking about 40 per cent.

2. The native piney woods rams shear about 3.8 pounds of wool which is 2.89 inches (7.34 c.m.) in length and which shrinks 40 per cent.
3. The native wether shears a heavier fleece than the ewe or ram, his fleece weighing about 4.0 pounds, shrinking about 38 per cent and measuring about 2.50 inches (6.53 c.m.) in length.
4. Native sheep carrying some Cheviot breeding and run under fenced pasture conditions averaged 3.46 pounds per ewe, 4.07 for rams and 4.43 for wethers. The shrinkages for the three groups were 34 per cent, 37 per cent and 35 per cent, respectively.
5. A sheep seems to shear his heaviest fleece at two years of age (yearling fleece). The following years, his fleece seems to get progressively lighter. This tendency is most pronounced in the ewe and least in the wether. The lamb fleece (first year) is heavier than the fleece shorn the third year, but is not as heavy as the second fleece.
6. Sex has a very pronounced influence upon fleece weight, ewes shearing the lightest fleeces and wethers the heaviest.
7. Winter feeding apparently increases the wool production of ewes about a half a pound.
8. One effect of late shearing is an increase in weight due in part to an increase in shrinkage.
9. Using purebred Delaine Merino rams increase the wool production. Native ewes shear about 2.88 pounds of wool. First cross, Merino X Native ewes sheared 6.74 pounds of wool for their first fleece. Purebred Merino ewes sheared 11.88 pounds for about 10 months growth.

AGRICULTURAL ENGINEERING

A STUDY OF THE DEFICIENCIES OF AGRICULTURAL IMPLEMENTS AS APPLIED TO SUGARCANE CULTURE

Barr

This project was undertaken because of the little or no satisfactory power operated field equipment being available for use on sugarcane plantations.

A three-row overhead beam cultivator for trailing behind a small tractor was designed, built and tried out. This machine satisfactorily demonstrated the feasibility of such machines; but needs some mechanical refinements.

Sets of disc, spring teeth cultivators, and a sweep were adapted to the Oliver No. 4 cane plow so that a minimum of cane roots would be cut and a satisfactory clean, mulched middle left back of the implement.

A five-foot, heavy disc, with 22-inch blades, loaded with 700 pounds additional weight, in two trips over the field gave the best job of stubble destroying. This required one hour and fifty minutes per acre with a 15-30 tractor.

Considerable time was spent in cooperation with several of the machinery manufacturers, looking towards their making machines better adapted to the sugarcane needs. During the past season special cane model tractors have been announced by Case, Caterpillar, and International Harvester Company. John Deere and Killefer each announcing heavy duty tool carriages with chisel teeth, middle bursters, or disc units.

The chiseling of sugarcane 12″ to 16″ deep in the bottom of the bar-off furrow gave a slight advantage on check plots, no material difference on the fertilized plots, and in no case sufficient gain to pay for the additional expense of chiseling. However on land having a hard pan layer 8″ to 10″ down, it is believed some advantage would be obtained, but we do not have any figures on the latter.

Producing Corn and Soybeans With Mechanical Power

Barr

By a few changes in equipment it has been found entirely feasible to produce corn and soybeans with mechanical power on the Louisiana alluvial lands.

A considerable saving of tractor and man hours was made possible by the combining of three operations into one and changing the type of machine and operation used in seed bed preparation. The bedding, floating, and planting was performed in one trip through the field with a general purpose tractor. The rate of germination and stand was as good as that on beds which had stood for some time.

The plow in seed-bed preparation has been replaced by two strips of heavy disc. This has reduced the tractor and man hours 2.25 per acre with an acre yield slightly above that of any other block.

A single "Pulverator" unit for a 22-inch brush plow did a nice job of seed-bed preparation; but the blades and shaft failed to stand up under this use.

LABOR AND POWER SUMMARY

	Hours per Acre		
	Mule	Tractor	Man
Two-mule Implements	39.35	0	20.28
Two-mule Plowing—balance 4-mule implements	34.49	0	16.96
General Purpose Tractor—Plow Preparation	0	6.28	7.64
General Purpose Tractor—Disc Preparation	0	4.385	5.55
General Purpose Tractor—Disc Preparation, 4-mule, 2-row cultivator	7.47	2.44	5.98

(The above does not include gathering)

IMPROVED METHOD FOR HANDLING HAY

Barr

Experiments were conducted to determine the possibility of storing hay by chopping and elevating with a recently developed hay chopper. With a quarter-inch cut the storage space per ton of coarse soybean hay was reduced 66 per cent. With a mixed crabgrass and clover hay the chopped hay required 58% of the space required by the unchopped, and the baled 38% of that of the unchopped.

No difference in keeping quality can be found after five months storage between the whole, and chopped hay. At the time of storage the hay had a moisture content of 10 per cent. The humid climate of this location has not affected the keeping of the hays.

The cost of storing in the barn by chopping over a hay fork method will be about 25 cents per ton.

SUBSOILING OF COTTON LAND

Barr-Mayer

Previous to bedding for cotton a single shank chisel was used in subsoiling a block of the bench land. The chisel was operated to a depth of 12 to 14 inches in the location directly above which the new bed would be thrown up. A much greater per cent of well-formed tap roots was produced on the subsoiled block. The unsubsoiled block showed a definite plow sole or very compact layer of silt loam ¾-inch to 1-inch thick at a point 5 inches below the surface. In this unsubsoiled block the tap roots which succeeded in going through this layer were mostly spindly and very crooked.

The subsoiled plot yielded slightly more than the unsubsoiled but not enough to pay for the increased cost.

DRAFT OF CANE WAGONS

Barr

The draft of cane wagons was undertaken because of the difficult and expensive hauling conditions under which most of Louisiana's sugarcane is harvested. A preliminary study brought out the fact that many of our plantation wagons weigh as much or more than the average load hauled.

A special cane wagon modified to our specifications was purchased for use in this work. Steel wheels of various heights and width of tires, as well as air wheels, are to be tested.

Dynamometer tests on several special cane wagons, typical plantation cane wagons, and our own wagon are now being carried on.

To date sufficient tests have not been made to warrant any conclusions.

ARTIFICIAL CURING OF HAY

Whipple-Barr

Changes have been made in the hay drier at the University to improve the quality of the hay, to lessen the need of skilled supervision and to produce a drier of low first cost which would be dependable in drying all hay crops.

New type burners were installed which gave a more complete combustion of fuel and a higher quality product.

With direct radiation from the flame to the wet material eliminated, the process of drying was slowed down and higher outlet temperatures were necessary than when the incoming material was first heated by radiation and the drying completed by convection currents of hot gases. With this outfit the quality of the dried hay was excellent but the capacity of the drier could not be forced above one ton of dried hay per hour with an evaporation of 2½ tons of water per hour even with a furnace temperature of 1600°F.

The experiment station was asked to furnish design for a drier similar to the one at the station with improvements based on tests and as result there was built near Franklin, La., a similar drier with the incandescent flame in full view of the incoming wet hay. The rapid heating of the wet material by radiation followed by the slower evaporation by convection as it was carried through the drum greatly increased the capacity of the drier without apparently lowering the quality of the dried hay.

The furnace of the University drier is being changed to bring the flame close to the incoming material.

In picking up the green material after mowing, a double cylinder loader handled alfalfa successfully from the swath; but would not handle green soybeans.

Soybeans planted in 22-inch rows and cut with a corn binder gave more economical field operations. At the drier this bundled material eliminated one feeder and enabled the cutter to produce a more uniformly chopped hay.

Feeding trials of dehydrated hays to both dairy and beef cattle are now under way.

AGRICULTURAL ENGINEERING

An Investigation of Milling of P. O. J. Canes

Whipple

A discussion of this project with the contact committee of the American Sugar Cane League resulted in the conclusion that a comparison of milling equipment, settings, speeds and pressures combined with figures for rate of grinding, amount and temperature of maceration water and reliable extraction figures would be of great value in helping to lessen the large loss of sugar in the bagasse of Louisiana mills.

Questionaires were sent to all active sugar factories in the state in order to compare the mill settings. The work of the mills is being compared by the "lost juice figure" which represents the undiluted juice in bagasse percent fibre in bagasse as it was found that sucrose extraction figures were not comparable owing to the lack of necessary weighing equipment in most of the factories.

The figures obtained by the factory chemists are used in those factories which have chemical control, but these are supplemented by tests made by the experiment station in many of the sugar houses, samples of first expressed juice, mixed juice, residual juice and bagasse being taken for analyses.

Cane Freezing

Whipple

During the fall of 1930 experiments were made with a portable refrigerator built to freeze a row of standing cane 18 feet long in order to help study the problem of how to lessen the loss of damage from freezing on a crop of Louisiana sugar cane and the relative deterioration of different varieties.

Rows of cane 18 feet long of P. O. J. 234 and 36-M varieties were subjected to varying temperatures as low as 13 degrees F. One-third of the row was windrowed immediately, one-third after a lapse of a few days and the remaining one-third allowed to remain standing.

The standing and the windrowed canes were tested every seven days and the rate of deterioration determined by the drop in purity and the rise in acidity.

It was found that a minimum temperature as low as 23 degrees F., even though the temperature remained below 32 degrees for less than 2 hours, was sufficient to kill all the eyes as well as the bud. Cane in this condition deteriorated most slowly when windrowed immediately after the freeze. Cane with the bottom leaves and eyes not killed deteriorated faster when windowed than when kept standing. The tests indicated a much slower rate of deterioration in the 36-M than in the 234 variety.

DAIRYING

Dairy Work at North Louisiana Experiment Station

Lush

Ten grade Jersy cows were purchased to determine the value of a purebred bull in increasing production and to measure the returns from various grazing crops. The ten cows averaged 6181 pounds milk and 308 pounds fat in 1930 and 6292 pounds milk and 312 pounds fat in 1931 with 23 percent less grain fed. The difference is largely due to improvement in pasture and grazing crops. Six of the cows increased 9.2 percent in production over previous owners' records. The feed and pasture cost per pound of butterfat was 30c in 1930 and 20c in 1931. With a whole milk market the cows returned $3.70 in 1930 and $3.45 in 1931 per day above feed and pasture cost to pay for labor, depreciation and other costs.

Nine heifer calves have been dropped in two years. The average feed cost of raising the oldest three to one year of age was $43.09 and four others in 1931 was $33.53. Liberal use of skim milk powder and grain at an early age are responsible for low cost and splendid growth. A satisfactory trench silo 8' X 7' X 6' by 56 feet long was constructed on a sloping hillside to insure drainage. One hundred and fifty man and 43 team-hours were used in construction. Sorgo fodder cut and uncut is being compared for silage. Silage has aided in maintaining milk production in 1931.

A satisfactory cooling tank was constructed of concrete and corkboard and is operated by an electric refrigerating unit. The cost of cooling 100 pounds millk effectively has been 7c with power at 3.5c per k. w. h. The total cost of operation is about 13c per 100 pounds or slightly over 1c per gallon. Costs are about twice as high in summer as winter.

The average length of milking each cow was 18.8 minutes per day during a week's trial.

PERMANENT PASTURE

Flat breaking ground in the fall left it too loose for pasturing or mowing. No treatment allowed rye grass seed to "drift". Discing appeared satisfactory. Of four clovers seeded, only the white Dutch and native hop have been persistent to date. All clovers are more prevalent on limed areas and on richer soils. Rye grass and rescue grass were more abundant on richer land. The paspalums are increasing and Bermuda has maintained itself on the better land. Weeds have been reduced by mowing and where trees have been removed, grass is more abundant. This is especially true of a pine land pasture where no grass seed has been sown except through manure.

The use of 400 pounds of a 4-10-5 fertilizer as a top dressing gave a grass yield of 13,562 pounds in two cuttings in 1931. Without nitrogen the yield was about 10,000 pounds grass with or without potash. With no treatment there were 8,006 pounds grass per acre. The difference was more marked in early spring and the stand of clovers better on the fertilized areas. On land with a fair stand of clovers, 200 pounds of nitrate of soda with 400 pounds superphosphate or with lime gave 28,000 pounds grass. With one-half as much nitrate, lime alone or nitrate alone, the yields fell to approximately one-half as much. These results, while preliminary, indicate the importance of nitrate, phosphate and lime all being added to similar hill pastures.

TEMPORARY PASTURE

For winter pasture a mixture of Abruzzi rye and vetch withstood the cold weather of 1930, while oats and vetch were slightly superior in 1931. The respective acre values of rye, oats and barley on a basis of 40c per pound fat for 1931 are $9.77, $11.35 and $4.10. The oats also gave 2.61 tons hay per acre. This test is being continued to find a satisfactory winter grazing crop or combination of crops.

A 5.5 acre field of Sudan gave 251 cow days' grazing in 1930 and 5 acres 162 cow days in 1931. During the latter season Sudan increased milk flow 3 pounds per cow or 13.6 percent over permanent pasture. Sudan planted April 1, failed to make satisfactory growth. Cowpeas planted as a catch crop increased production 11.5 pounds per day for 9 cows during nine days.

Echindorf beets and Mammoth red mangels well fertilized in spring gave 18.7 and 14.5 tons per acre respectively in one trial. The cows relished the beets in September but apparently no increase in production occurred.

Kudzu crowns were successfully established on thin land by careful fertilization and setting in hills.

The value of all these pastures on the basis of dry feed replaced or saved by their use appears to be $16.43 per acre for 1930 and $10.83 per acre in 1931. In the past year 25 tons of hay was also produced on this 30 acres so that the value is much greater in 1931 in spite of low feed prices.

Cottonseed fed with legume hay in dry lot or on pasture up to 8 pounds per day has apparently no marked effect on health of four cows to date. Cows refused it without 20 to 25 percent corn meal, however. Milk production hasn't been as satisfactory in either case as the reguar herd ration.

LIMITED GRAIN FEEDING FOR MILK PRODUCTION

Lush

The purpose of this test was to determine the proper amount of grain to add to good pasture or roughage for most economical milk production. Two years' results with three groups of nine cows, each fed varying amounts or no grain, indicate that pasture and roughage will give about 61 percent of their production on a full grain ration. Cows changed from a full grain ration to grain at the rate of one pound for each four pounds Jersey or six pounds Holstien milk with more roughage produced as much during the following year as previously. However a group of cows fed for two years at this rate produced only 90 percent as much the second year as the first. The results to date have been somewhat affected by irregular breeding, a dry summer in 1930 and limited roughage in 1931, but clearly indicate that when the market price for milk is $2.00 per cwt. or above, grain can be fed liberally. As the price of milk drops below 17c per gallon or $.50 per pound butterfat, less grain can be economically fed. At a price of 30c per pound fat, the most economical production occurs on roughage plus good pasture at prevailing feed prices for cows capable of producing 250 to 300 pounds butterfat per year. The highest production attained on roughage alone was 234 pounds butterfat in 10 months, while the highest production on full grain was 340 pounds butterfat in a like period. Individual cows varied widely within the same groups, but ten out of twenty cows produced more on low grain and large amounts of roughage than when normally fed. All but one cow produced more on full grain than on roughage alone. Grain feeding caused a gain in weight and was of value in periods of short pasture. In every case pasture furnished from 50 to 80 percent of the nutrients consumed for the year and its condition was reflected in the milk flow.

COMPOSITION AND YIELD OF PASTURE GRASSES

Th feed cost of butterfat produced by the L. S. U. dairy during 1929 and 1930 averaged 21c per pound less during the eight pasture months than during four winter months. From March to August during the past three years, these cows averaged 64.6 percent of their feed nutrients from pasture. In terms of dry feed replaced with pasture, the respective values of pasture per cow are $51.37, $40.04 and $30.13 for those seasons.

To obtain pasture yields and composition of grass, caged areas were clipped at monthly intervals during the past two years. The average yield of grass has been 45,003 pounds and of air-dried hay 11,330 pounds per ace. Yields averaged 28 percent higher in 1931 than 1930. The highest plot yield was 18,751 pounds hay on rich low land. Areas treated with 100 to 200 pounds nitrate of soda or 150 to 300 pounds superphosphate apparently yielded no more grass nor difference in composition than untreated areas on bluff land and lowland. The fertility of this land is high.

The analyses from 163 samples of grass indicate similar seasonal trends from high protein and low fiber and carbohydrate content in early spring to low protein and high fiber in late summer. Twenty to 25 percent of the dry matter of March grass was protein and 9 to 12 percent in August. Rye grass and clover in January was over 26%

protein. The ash and fat content varied but little. Grass is thus a watered concentrate and other feed should be adjusted to its seasonal composition.

Results obtained in cooperation with Professor J. L. Fletcher of Southwest Louisiana Institute indicate that 200 pounds nitrate of soda and 200 pounds superphosphate are extremely profitable at Lafayette. The former gave an increase of 54.2 percent and the latter 21.9 percent of hay on a clover field. Used together an increase of 67.6 percent or nearly 2 tons of hay more per acre was obtained. Liming with two tons ground oyster shell reduced the acidity and increased the grass yield 16.4 percent regardless of other treatment in 1931. On plots containing Bermuda and rye grass with clover, the same amounts of nitrate and phosphate trebled the yield of grass over an untreated area. In a pasture test covering 121 days previous to September 1, this treated pasture carried an average of 2.47 cows per acre, producing 5652.6 pounds milk per acre as compared to 1.59 cows and 4076.6 pounds from an untreated acre. The returns over feed and fertilizer cost per acre at 35c per pound butterfat were $14.56 greater for the fertilized than untreated pasture.

There was no significant difference in the chemical composition of hay cut the same date, regardless of treatment except on an ammonium sulphate plot with poor yield of clover. Hay cut four times during the season showed the same decline from high protein as grass clippings at Baton Rouge.

The results warrant the conclusion that fertility is important in determining total yield but of little importance in its effect on composition of the same vegetation. However, season of year or rate of growth is more important than type of vegetation in influencing the protein and fiber content of frequently clipped pastures.

A COMPARISON OF CONTINUOUS FEEDING OF COTTONSEED MEAL AND SOYBEAN MEAL ON GROWTH AND MILK PRODUCTION

The object here was to observe the effect of these high protein feeds on developing heifers. Yellow corn meal, 25 percent of the protein feed, ground oyster shell and salt plus silage or pasture constitute the sole ration of each group. No hay has been fed in over two years.

The results with nine Holstiens indicate soybean meal to be fully equal to high grade cottonseed meal in promoting growth, reproduction and milk production. Since freshening the soybean meal heifers have averaged 44.8 pounds milk compared to 38.6 pounds for the cottonseed meal group. No ill effects have occurred except in one heifer that was over-fed and she responded to a reduction in grain. An average of over 4 pounds of either soybean meal or cottonseed meal per day has been fed without any noticeable digestive disturbance. Growth and production have been entirely satisfactory without the use of hay or bulk in the grain ration. Because of a higher market price of soybean meal, the feed cost averaged $60.25 in that group as compared to $53.13 for the cottonseed meal heifers from 10 months until calving time. The feed cost per pound butterfat produced is likewise slightly higher.

WHOLE COTTONSEED FOR MILK PRODUCTION

Because of the large supply of low-priced cottonseed available last fall, a three months' comparison of its feeding value with that of cottonseed meal was made. Eight cows were fed on soybean hay, silage, and a grain mixture of corn, oats and bran with either one-third cottonseed or one-fifth cottonseed meal for alternate 30-day periods. The results indicate that 100 pounds choice cottonseed meal is equal to 206 pounds of whole cottonseed under these conditions. If seed sell for $9, one can afford to buy meal at $18.54 per ton. No laxative condition developed even though one cow averaged 7 pounds seed daily for a month. The quality of butter produced is being determined in cooperation with the University dairy department.

GROUND DEHYDRATED SOYBEAN HAY FED AS A CONCENTRATE

Due to the interest in artificial drying of hay, a small test was made in the summer of 1930 of its value supplemented with 20 percent molasses against a grain ration. Two groups of five cows each were used for alternate periods of 25 days, all cows having access to good pasture. The results indicate 20.4 percent more milk while on the grain ration than on the soybean hay mixture. Two cows refused to eat the soybean hay mixture consistently. Three other cows fed a dehydrated soybean hay as 37 to 66 percent of the grain during this time produced 91 percent as much as on grain. Evidently dehydrated soybean hay cannot replace a good grain mixture for cows on pasture in spite of a similar analysis.

METHODS AND COSTS OF RAISING DAIRY CALVES AND HEIFERS*

To obtain data on the cost of raising good calves where whole milk is sold, a study was made of amount of milk and feed exclusive of pasture fed to purebred heifer calves in the University herd during the past four years. Current feed prices were used and milk valued at what it might be sold for if no surplus were produced. An average of 932 whole, 2251 liquid and 49 pounds skimmilk powder and 604 pounds grain were fed to one year of age.

On this basis, the average feed cost to six months was $45.65, to one year $70.80, two years $93.91 and first calving $97.98. When present feed prices are applied to feed consumed and butterfat is marketed, the respective feed costs are $16.73, $29.42, $41.71 and $45.78. Nine heavily fed Holsteins cost $142.75 to attain the latter age.

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*We are indebted to A. P. Kerr, Chief Chemist, and associates for analyses and to the L. S. U. Dairy for use of equipment and some records.

Thirty yearling heifers made an average daily gain of 1.18 pounds from March 1 to December 5, 1931, on pasture alone. Holstein calves fed only six or nine pounds of whole milk per day and weaned at 50 days of age to a grain mixture containing 25 percent skimmilk powder failed to make satisfactory growth.

The results indicate that the whole milk dairyman can lower costs of raising the best calves by substituting skimmilk powder for part of the whole milk fed remixed or in the grain, feeding more grain to young calves and providing good pasture for heifers.

COMPOSITION OF PASTURE GRASSES CUT MONTHLY—1931 AT L. S. U.

Grass to date Cut	No. Samples	Ht. Inches	Dry Matter in 100 lb. Grass	Percent of Dry Matter					Nutritive Value of 100 lbs. Grass T. D. N.	N. R.
				Crude Protein	Fat	N. F. E.	Fiber	Ash		
White clover 1/15/31	1	4	13.67	27.94	4.39	42.14	13.24	12.28	8.68	1:2.1
Rye grass 1/15/31	3	5	16.69	26.58	5.10	37.14	17.61	13.56	9.29	1:2.2
Rye grass & clover 3/5/31	4	2.5	18.28	20.18	4.29	37.18	27.72	10.63	11.47	.....
Rye grass & clover 4/6/31	4	4	17.33	19.82	4.26	44.80	21.35	9.77	11.06	.....
Rye grass & clover 5/5/31	6	7	16.55	18.32	4.69	41.52	24.84	10.66	10.46	.....
Rye grass, clover & Bermuda 6/4/31	6	5	28.42	15.76	2.91	42.54	28.89	9.90	17.57	.....
Texas bluegrass 4/6/31	1	4	13.15	26.98	5.17	38.30	16.03	13.52	8.28	.....
White clover 3/5/31	6	7	13.89	25.63	3.74	39.18	19.56	10.59	8.68	.....
White clover 4/6/31	8	5	14.83	25.63	3.89	43.38	16.24	10.86	9.44	.....
White clover 5/5/31	6	6.5	15.81	24.69	4.28	40.66	20.27	10.19	10.12	.....
White clover, Dallis & Bermuda 6/4/31	7	4	27.45	21.13	2.79	42.77	22.60	10.70	17.04	.....
Pure Bermuda 9/15/31	2	4	35.29	11.63	2.74	49.81	26.84	8.98	16.85	.....
Dallis Bermuda, Foxtail 9/15/31	6	4.8	31.17	9.82	2.98	56.28	29.91	9.34	16.18	.....
Ave. grasses cut 3/5/31	10	5.2	15.65	23.45	3.96	38.38	22.82	10.61	9.80	1:2.6
Ave. grasses cut 4/6/31	13	6.4	15.47	23.95	4.10	43.43	17.80	10.73	10.73	.....
Ave. grasses cut 5/5/31	12	7	16.18	21.51	4.48	41.09	22.56	10.43	10.29	.....
Ave. grasses cut 6/4/31	13	4.5	27.90	18.65	2.85	42.66	25.50	10.33	17.28	1:3.48
Ave. grasses cut 7/16/31	11	4.8	30.22	13.04	3.14	46.15	27.32	9.46	14.36	.....
Ave. grasses cut 8/14/31	12	7.8	28.35	12.48	3.86	45.74	28.50	9.42	13.69	1:6.44
Ave. grasses cut 9/15/31	12	4.8	31.24	10.36	2.95	49.26	29.01	9.23	15.12	1:7.98
Ave. grasses cut 10/29/31	12	3.4	31.86	11.06	2.31	47.62	29.33	9.44	15.13	1:7.25
Ave. all 1931 samples	95	5.5	24.67	16.81	3.45	49.37	25.31	9.46	13.38	1:3.61

AVERAGE FEED COST OF RAISING CALVES, L. S. U.

Date dropped	6 mo.			12 mo.			24 mo.			All calves to date		
	1928	1929	1930	1931	1928	1929	1930	1928	1929	6 mo.	12 mo.	24 mo.
No. calves	26	37	28	9	26	34	27	26	31	100	87	57
Days fed whole milk	103	88	72	78	103	91	72	103	91	86	89	96
Whole milk, lbs.	1050	891	832	863	1050	917	837	1050	917	913	932	978
Skimmilk, lbs.	868	1070	1514	1238	1826	2643	2168	1826	2663	1157	2251	2281
Skimmilk powder, lbs.	....	28	30	....	2.5	65	79	12.8	116	18.7	49	68.9
Cost of milk	$ 43.48	$ 43.19	$ 36.92	$ 26.02	$ 58.05	$ 58.67	$ 43.18	$ 58.24	$ 62.36	$ 39.96	$ 53.68	$ 60.48
Grain, lbs.	187	219	273	229	390	748	630	1015	1270	227	604	1154
Cost of grain	$ 3.82	$ 4.23	$ 4.40	$ 2.30	$ 8.63	$ 13.16	$ 9.45	$ 20.71	$ 22.14	$ 4.00	$ 10.65	$ 21.49
Total feed cost	$ 49.40	$ 49.22	$ 43.06	$ 28.26	$ 76.56	$ 76.26	$ 58.38	$ 93.80	$ 94.00	$ 45.65	$ 70.80	$ 93.91

ENTOMOLOGY DEPARTMENT

Sugarcane Borer: Artificial Control

Hinds-Spencer-Osterberger

By the use of dusts of Sodium and Barium fluosilicates applied to cane by hand, saddle or traction dusters for treatment of second generation borer larvae especially, it has been found possible to destroy more than 50% of the borer larvae at a time when natural control is usually very slight.

Studies of the borer population in hibernation have enabled us repeatedly to forecast quite correctly the prospect for borer scarcity or abundance in the early summer gerations.

The principal medium for borer hibernation during recent years has been found in cane top trash. By tests of various methods of disposing of or treating this trash, it now appears that immediate partial burial of green trash is not advisable; that only about one-tenth of the hibernating larvae have survived in cuts where trash was thoroughly burned early in the winter as in similarly infested cuts where trash remained on the surface unburned until time for cultivation or where similar trash was partially buried in January; that the addition of 200 lbs. of Ammonium sulphate per acre at about February 1st, followed by partial burial of trash, resulted (in the single test made) in a marked increase in decomposition of trash and in a decrease in borer survival. Johnson grass and sorghum stubble may also serve as hibernation quarters for large numbers of borers and corn stubble is occasionally a serious factor.

SUGARCANE BORER ARTIFICIAL CONTROL

Hinds-Spencer-Osterberger-Stracener

The principal effort of the biennium has been to determine the practicability of controlling the borer by field colonizations of the native egg parasite, *Trichogramma minutum* Riley, which is bred in the laboratory in enormous numbers during the winter, spring and summer upon the eggs of the Angumois grain moths (*Sitotroga cerealella* Ol.) which are bred in stored corn or other grains. During five seasons these field colonizations have shown consistently beneficial results. In seven front cuts colonized at Cinclare the average percentage of borer eggs parasitized from June 11 to September 13 was 64.1%, while in the check areas uncolonized it averaged for the same period 11.8%. The rate of colonization in these fields was 22,000 per acre. A normal yield of cane was harvested here.

In 1931 tests, many more fields were under close observation and colonizations at rates of 5000 to 10,000 per acre were scattered from the middle of June to the first week of September. Among egg collections made from June 26 to Sept. 21, the following results were found:

No. of Fields Averaged	Colonized, Adjacent or Check	Total No. Eggs Examined	Average % Parasitized for Season
28	Colonized	80,221	70.2
11	Adjacent	41,105	66.8
25	Check	35,234	19.4

These records show the destruction of 70% of the borer eggs for the season in colonized fields as compared with less than 20% average in uncolonized fields in 1931. The average rate of colonization was from 5,000 to 6,000 per acre for the areas protected.

Furthermore the emergence holes of borer moths, as found at harvest time, showed that there were fully developed throughout the summer in colonized fields only 1 moth per 6.21 stalks, in adjacent fields only 1 moth per 5.41 stalks, while in our check fields there was 1 moth per 3.96 stalks, and in the average of 7 heavily infested uncolonized areas there was 1 moth per 1.99 stalks.

The average percentage of joints bored in colonized and adjacent fields combined was 35.0%, while in uncolonized fields it was 53.5%. The amount of borer injury per infested joint was much heavier in uncolonized than in protected areas.

Improvements have been made in grain moth production, especially through the development of very inexpensive, yet satisfactory, home-made equipment for maintaining desired temperature and relative humidity control both in winter and in summer.

SUGARCANE BEETLE STUDIES

Osterberger

A close study of the effect of the destruction of the "mother stalk" (original sprout) in a stool by sugarcane beetle attack has shown for such stools a reduction in sugar produced at harvest time averaging 25% below that obtained in comparable, uninjured, adjacent stools. There is but one generation of these beetles annually. During a period of several weeks, after the mean temperature of surface soil reaches above 60°F., the overwintered beetles are depositing their eggs singly in the soil near where they are feeding. The grubs develop there and feed only on decaying vegetable matter in the soil—never on living roots. They transform to the adult stage mainly during August and September and then feed for a time on the rootstocks of cane, grasses or some other possible food supply until time to hibernate. They hibernate in the adult stage, spending the winter in chambers or cells which they form somewhere in the upper few inches of soil and in the immediate vicinity of where they became adult.

SUGARCANE ROOTSTOCK WEEVILS

Osterberger

It has been known for twenty years that a small weevil species, with adults slightly less than one-eighth inch long, has been breeding in the rootstocks of cane. The injury caused by these weevils has not been considered serious. However, during the season of 1931, we have found that this type of injury may be a very serious factor in causing the loss in stand in stubble cane through the destruction of the eyes in the rootstocks. We have attempted to measure the seriousness of this problem in a preliminary way and find that infestation occurs in every field examined from Baton Rouge to the southern and western sections of the Cane Belt. The stand of cane in first year stubble was lost completely on some ten acres and very seriously reduced on some ninety acres more at Arnaudville in the spring of 1931.

Examinations of stubble stools have shown from 75 to 100% of the rootstocks infested, with from 1 to 23 stages per rootstock. All stages except the eggs have been found in the fields during September to December. Natural mortality has been less than 10% in all cases. From 30 to 50% of all eyes were destroyed before the end of December, and the injury was increasing steadily with no indication of hibernation at that time.

There is evidence also of serious injury to the eyes of cane planted in infested areas. In one case 20% of these eyes had been destroyed, and larval, pupal and adult stages were found present in the eyes, within two months after the cane was planted. These weevil stages had evidently migrated from other host plants to the planted cane during this period. Infestation occurs abundantly in some native grasses in uncultivated areas.

Two species of weevils belonging to same genus are associated in this work. The less common species is black in color and has been described as *Anacentrinus deplanatus*

(Csy.) This species has been known to occur on the rootstocks of barnyard grass or cockspur grass, through the area from Louisiana and Texas northward to South Dakota. The other species, reddish-brown in color, is much more numerous and has proved to be a new species. It has now been described by Mr. L. L. Buchanan of the U. S. Bureau of Entomology as *Anacentrinus subnudus* Buch., and is known thus far only from the Cane Belt of Louisiana.

SOIL ANIMALS ATTACKING CANE

Stracener

The principal injury to cane roots has been found to be caused by the tiny springtail known as "the scooter" (*Lepidocyrtus violentus*) and by two very delicate, slender, white *Symphyllids* which also eat off the delicate root hairs through which the plant absorbs its food and also cause many pits in the cortex of the roots. The reduction in root hair formation appears to be the most serious type of injury. Altogether these soil insects appear to retard the maturity of cane and to reduce the weight of harvested cane by about one-sixth (from 15 to 18%), and with a corresponding loss in sugar. This is shown by an average of a number of stools grown in galvanized iron cylinders, with steam sterilized soil in both check and soil animal drums.

CORN FUMIGATION

Spencer

In the final summary on this work it was found that the "black weevil" or "rice weevil" (*Sitophilus oryzae* L.) is the most important enemy of corn grain. This, and the less important grain feeding species together, cause the destruction of nearly 10% of the corn produced in Louisiana. In attempts to control these insects by fumigation of the corn as stored in the bins, it was found that Paradichlorobenzene (P.D.B.) was very satisfactory for the treatment of seed corn or corn that is to be fed to work animals but that it should not be used with grain intended as food for human beings, poultry, or dairy cows, on account of the persistance of a disagreeable flavor in products produced therefrom. The most satisfactory fumigating material found for general use was carbon disulphide (CS_2) applied in cribs which have been made really "tight" by lining preferably with sheets of galvinized iron, the sheets so laid that the edges over-lap and are first painted with cold tar then closely nailed and finally painted all over to prevent rusting. This makes the cribs mouse and rat proof as well. The temperature should be well above 60° F. before and during the treatment for effective results and a dosage of at least twenty pounds (pints) per 1000 cubic feet is advised.

Preliminary tests of orthodichlorobenzene and of chlorpicrin indicate that these materials are promising as grain fumigants.

DUTOX FELLOWSHIP

Becnel

In April, 1931, the Grasselli Chemical Company, of Cleveland, Ohio, established a cooperative Fellowship Fund for a special study of Dutox. This is a new Barium fluosillicate insecticidal material. Mr. I. J. Becnel has been conducting this investigation which has been designed to discover the practical applications of this material to various crops and insect control problems of the South and especially in the Gulf Coast section. This material has been proven to be notably free from chemical burning effects on a number of kinds of plants on which arsenicals cannot be used safely and has also shown superior value in the control of a number of species of insect pests when compared with other insecticides.

The investigation is still in progress.

MISCELLANEOUS INVESTIGATIONS

Hinds-Osterberger-Stracener

These have included special studies of the velvet bean caterpillar *(Anticarsia gemmatilis)* which has occasionally appeared as a serious pest on soybeans in Louisiana, the soybean hay caterpillar (*Herculia psammioxantha* Dyar) another tropical species which has occasionally injured soybean hay in the stacks or bales; and the salt marsh caterpillar (*Estigmene acraea* Drury) which sometimes becomes a serious pest on cotton and other crops in Southern Louisiana especially. Publications have been issued on all of these pests.

HOME ECONOMICS

THE ANTI-RACHITIC EFFECT OF ACIDOPHILUS MILK

Sunderlin

Tests were made on 583 rachitic rats.* The following conclusions are drawn:

1. Acidophilus milk had no greater prophylactic or curative effect on rickets in rats than uninoculated milk. It did not produce a lowered fecal pH when fed in conjunction with either Steenbock's rachitic diet or the stock diet.

2. Acidophilus milk fed with Steenbock's rachitic diet modified by the addition of 25% lactose showed a definite prophylactic effect against rickets. This effect was largely, if not entirely, due to the lactose as a similar effect was observed when the modified rachitic diet was fed with uninoculated milk.

3. Lactose had a definite prohylatic effect against rickets when 25% was added to Steenbock's rachitic diet. The diets modified by 25% sucrose, dextrose or maltrose produced a slightly less severe rachitic condition than the unmodified diet, but the condition produced by the "lactose

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* 341 rachitic rats in 1930; 148 in 1929; 140 in 1931. Total 629 (46 discarded). Total 583.

diet" was definitely less severe than that produced by the other modified diets. This difference was not marked, but it was definite.

4. In using the curative instead of the preventive technique there was little or no healing of the rachitic condition attributable to the 25% lactose added to Steenbock's rachitic diet.

5. That C. P. lactose, a substance free from minerals and vitamin D, had any effect upon the severity of the rachitic condition suggests a relationship between the reaction of the contents of the intestinal tract and rickets. On the other hand, the fact that this lactose, which keeps the intestinal pH at nearly as low a level as cod liver oil does, has a decidedly smaller prophylactic effect against rickets than cod liver oil has, indicates that the intestinal pH, with its effect on the solubility of calcium and phosphorus, is only one of the factors in the etiology of rickets.

THE VITAMIN G CONTENT OF WHITE POTATO

Sunderlin

The Bourquin* technique was used to determine the Vitamin G content of potatoes of the Rural New Yorker variety. The experimental period was of 4 weeks duration, after the depletion period of 16 to 20 days. Daily supplements of freshly peeled, raw white potato were fed.

In these prelminary tests, 28 vitamin B and G depleted rats were fed varying amounts of potato, in addition to the modified diet containing an alcoholic extract of ground whole wheat as the source of vitamin B. The technique was not entirely satisfactory, as there was considerable variation in the response of rats in the same series. Only tentative conclusions can be drawn because of the small number of rats used. The average gains per week on the different diet modifiications are shown in Table 1 and Chart 1.

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* Bourquin, A.—Experiments on the quantitative determination of vitamin G.1929. Dissertation, Columbia University, New York.

The rats fed a daily supplement of 2 grams of potato averaged a gain of 5.4 grams per week more than the control rats on the vitamin G deficient diet.

These few data would indicate that the white potato tested contained at least 1 Bourquin unit of vitamin G per 2 grams of potato or at least 0.5 unit per gram.

If there is a connection between the deficiency of vitamin G in the diet and the occurrence of pellagra, increased potato consumption in pellagrous districts would be of value.

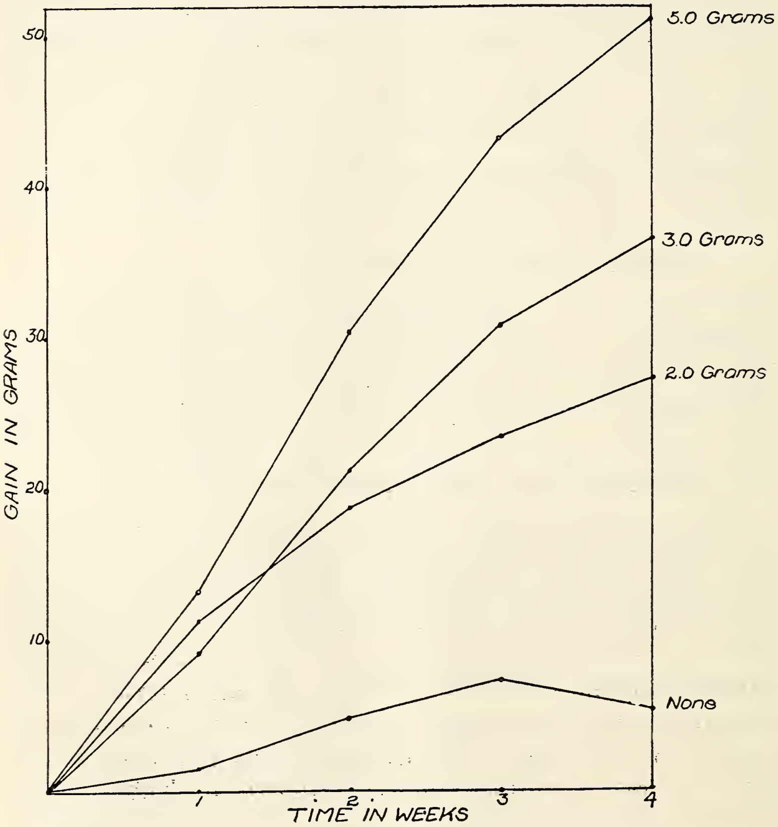

CHART 1. Curves showing average gains in weight of vitamin G deficient rats fed varying amounts of white potato as daily supplements. The amount of potato fed daily to each rat is indicated at the end of the curve.

TABLE 1.—AVERAGE GAINS PER WEEK OF VITAMIN G DEFICIENT RATS RECEIVING DAILY SUPPLEMENTS OF WHITE POTATO.

Number of rats	Daily supplement Gms. of potato	Average weekly gain 4 wk. period in gms.
11	0	1.4
10	2	6.8
3	3	9.2
4	5	12.8

HOME CANNING OF MEAT—LOUISIANA BULLETIN 220

Sunderlin

Seven hundred and seventy-nine pounds of beef and pork were canned in February, 1929 and 1930, with the following variables: Canning in glass and in tin, processing in the pressure cooker and in the boiling water bath, storing at room temperature and in the basement.

The glass jars were found to make perfect seals which were maintained during the storage period. The meat canned in glass showed no spoilage attributed to leaks or imperfect seals. Due to unexplained reasons, some spoilage due to imperfect seals or leaks occurred in the meat canned in tin cans in 1929, but none occurred in the meat canned in 1930.

There was no spoilage due to underprocessing in any of the meat processed for either 45 or 60 minutes at 15 pounds pressure in the No. 2 cans or pint jars. This was also true of that processed four hours in the boiling water bath. However, processing canned meat in the boiling water bath is not recommended in this climate because of the possibility of poisoning from botulism.

The meat stored in the basement showed more spoilage than that stored at room temperature. Even the basement temperatures were warm during the summer.

A TEST FOR THE VITAMIN D CONTENT OF SHRIMP MEAL AND SUN-DRIED SHRIMP

Both shrimp meal and sun-dried shrimp gave negative tests for vitamin D when fed at 1, 3, 5, 8 and 10% levels. The curative technique was used. Steenbock's rachitic diet 2965 was fed to 25 to 28 day old albino rats for 21 days. The diets modified by the addition of the shrimp meal and the sun-dried shrimp were fed for 5 to 6 days. A +2 line test at the end of that period was considered a positive test for vitamin D. The control rats that were fed cod liver oil at ¼% level showed a +2 line test, while none of the rats fed the test rations did.

The calcium and phosphorus content of the shrimp bran and the dried shrimp samples used had been determined and the $CaCo_3$ percentage in the ration was modified to keep the calcium-phosphorus ratio between 4.82 to 1 and 4.92 to 1. Twenty-eight rats from five litters were used.

HORTICULTURE

A. VEGETABLES

1. ASPARAGUS INVESTIGATIONS

Kimbrough

The purpose of this investigation is to determine the best cultural practices for asparagus growing in Louisiana.

The four phases of culture to be especially studied are:

(1) The time of the year the spears are cut.
(2) The effect of sex of plants on yield and grade of spears.
(3) The age to begin cutting.
(4) Fertilizer requirements.

The crowns have been growing in the field for one year. New shoots were put out at approximately one month intervals. The tops made excellent growth until late in the growing season, when a combination of dry weather and a cercospera disease were somewhat injurious.

This study of asparagus will include field plots and chemical studies in laboratory.

2. BEAN INVESTIGATIONS

Miller-Kimbrough

Experiments are being conducted to determine the fertilizer requirements, time of planting, planting distances and varieties of snap beans. Spring plantings of beans are made on plots located at Houma and at L. S. U. The fall crop is being grown at L. S. U. only. The variety used is the Giant Stringless Green-pod. Fertilizer was applied at the rate of 800 pounds of 4-8-4 per acre, except in rate of application tests. Beans were planted at equal intervals except in the planting distance test.

At Houma the application of nitrogen was profitable up to 6%, while at L. S. U. the application of nitrogen was of doubtful value. The application of phosphate was more consistently profitable than applications of nitrogen or potash. The most economical gains from phosphate were obtained, however, from the 4 to 8% applications. Results obtained from the application of potash were somewhat variable, with 2% proving more consistently profitable. A 4-8-4 fertilizer was applied in amounts varying from 0 to 1200 pounds per acre. From 200 to 400 pounds per acre have produced as high or higher yields than heavier rates of application. The fall crop has shown less response to fertilizer than spring crop.

Earlier plantings in the spring where good stands were obtained produced larger yields and were more profitable than later plantings.

Where the drill method was used and a good stand was obtained, the 2 to 3 inches spacing produced the best yields. Where the hill method was used, the spacing of 6 inches apart in the row and 3 seed to the hill was best.

3. Cabbage Breeding

Miller

One of the objects of this project is to study the mode of inheritance of premature seeding in cabbage. Results have been obtained from crosses between strains which are resistant to seeding and those which are susceptible. The results of such crosses indicate that premature seeding behaves as a recessive character. Additional crosses are being made to obtain data from a wide range of varieties of cabbage. It has been found that by inbreeding most of the plants which seed prematurely the first generation of inbreeding can be recognized and discarded. Data have been obtained which indicate that the percentage of seeders found in fields of cabbage produced under normal weather conditions is due to segregation from natural crossing with other members of the Brassica family, which seed more readily than cabbage. By selfing these normal seeders, many of the members of the Brassica family have been recovered, such as Sprouting broccoli, Kohl-rabi, Kale and leafy plants which resemble the wild cabbage.

Desirable strains which are resistant to premature seeding have been bred and seed from one of the best strains of Copenhagen Market have been sent to Denmark for reproduction.

Considerable attention has been given to methods of handling mature heads of cabbage from which seed are desired. The following method has proven best for local conditions: The seed should be planted to beds in July and transplanted to the field the latter part of August or first of September. The plants will mature during late fall and early winter. After selecting the desired plants, the mature head can be cut and examined for interior characters, such as core height and size, compactness of head, and for color and quality of the head. Stems possessing the root system of the desired head are dug and transplanted to the breeding plot. All but about five sprouts growing from the stem are removed. The sprouts develop into small heads from which seed stems will grow during the early spring. The mature seed is ready to harvest the latter part of May.

4. CABBAGE FERTILIZATION

Miller-Kimbrough

Experiments are being conducted to determine:

(1) The most economical percentages of nitrogen, phosphorus, and potash to apply.

(2) The most economical rate of application of complete fertilizer.

This experiment is being conducted on the bluff land soil at L. S. U. The Louisiana Copenhagen variety is being used in all tests. Except in the rate of application test, 800 pounds per acre of fertilizer were applied before plants were set in the field. All plots received 200 pounds of nitrate of soda as top dressings in two equal applications. Results for one year have been obtained.

The results obtained indicate that 6% nitrogen was most profitable, closely followed by 4%. In the superphosphate test, the application of 4% gave the highest yield. While the profits from the use of potash are not as large as from nitrogen and phosphorus, the results indicate that its application pays, with 4% showing the greatest return.

The rate of application test of complete fertilizer, 4-12-4, showed that 800 pounds per acre were the most economical.

5. CUCUMBER FERTILIZATION, VARIETY AND SPACING TEST

Miller-Kimbrough

The test to determine which of the fertilizer elements gave the greatest returns showed this to be phosphorus. The addition of nitrogen or potash had little or no influence upon yield. The application of 400 pounds per acre of 4-8-4 gave a higher yield than the heavier rates applied. The addition of 4 tons of stable manure to 400 pounds 4-8-4 per acre gave an increase in yield, but probably not enough to warrant its application.

Of six commercial varieties tested, the highest yielder was Kirby Stay Green, followed by Early Fortune and then Early White Spine.

The spacing test consisted of drilling seed in rows and when the plants were up, they were thinned to 6 inches apart; planting in hills 18 inches apart and 3 feet apart and thinning to two plants to the hill. The rows were 7 feet apart. The 18-inch spacing produced the largest yield of No. 1 cucumbers per acre.

6. IRISH POTATO INVESTIGATIONS

Miller-Kimbrough

To obtain information over a range of soil and climatic conditions, experiments were conducted at Houma, at Louisiana State University and at Alexandria. The Triumph variety of potatoes was used in all the experiments and all, other than the fertilizer tests, were given similar fertilizer treatment. The fertilizer at the rate of 800 pounds per acre was applied in the furrow at planting time and mixed with the soil before the potatoes were dropped. The seed pieces were accurately cut so as to average 1.5 oz. each. The seed pieces were placed 12 inches apart in the row and the rows were 3.5 feet apart at Louisiana State University and Alexandria and 5.5 feet apart at Houma. To partially overcome soil variation, each treatment was replicated five times.

Experiments are being conducted to determine:

(1) The fertilizer requirements of the potato in Louisiana.

(2) The effect of the size of the seed piece on yield.

(3) The effect of the planting distance on yield and grade.

(4) The value of ethylene cholorhydrin for breaking the rest period.

(5) The best cultural practices.

In some of the fertilizer experiments nitrogen, phosphoric acid and potash were varied in order to determine the most profitable percentage of each to use. It was found that, in 1930, a very dry year, 2% nitrogen was most profitable. In 1931, however, nitrogen was profitable in all tests and gave increased profits to the maximum application which was 6%. The 1931 season was very favorable to potato production. From 8 to 12% was the most profitable range of phosphoric acid. Variable results were obtained from the application of potash. In some of the tests profitable returns were obtained from applications as high as 8%, while in others potash applications did not pay.

A 4-8-4 fertilizer was applied in rates ranging from 400 to 2000 pounds per acre. The higher rates of application were most profitable. Increases obtained from applications above 1000 pounds were small however. Nitrate of soda at the rate of 200 pounds per acre applied to plots receiving 800 pounds of 4-8-4 per acre gave more profitable returns than the heaviest application of complete fertilizer alone. Three different sources of inorganic nitrogen were applied as top dressings and all gave profitable returns. Also muriate of potash applied as top dressing gave a profit.

Concentrated fertilizers, as Ammophoska and Nitrophoska, were tested in comparison with a 4-8-4 fertilizer. Rates applied were based on nitrogen equivalents. No significant differences were obtained between the concentrated fertilizers and the 4-8-4.

In the size of seed piece test the following sizes were tested: 0.5 oz., 1.0 oz., 1.5 oz., 2.0 oz. and 2.5 oz. The best returns were obtained with 1.0 oz. and 1.5 oz. seed pieces, with no significant difference between them.

The following intervals were used in the planting distance test: 8 in., 10 in., 12 in., 14 in., and 16 in. For the two years of this test the 14 in. spacing has been superior to the closer spacings.

Ethylene chlorohydrin has been tested for its effect on hastening the sprouting of fall grown potatoes used for seed. The treated potatoes, in the tests at Houma, showed that the treatment had a slight hastening effect on germination. Yields obtained were also somewhat higher. Tests at Baton Rouge showed no advantage for the treatment.

The cultural practices experiment included the following: Narrow rows, 3½ ft. wide, with half the area planted to potatoes and half to corn; wide rows, 7 ft. wide, with corn planted in the middles; wide rows, 7 ft. wide, with double rows of potatoes and no corn in the middles. The wide rows produced higher yields where equal areas were planted to both potatoes and corn. The narrow single rows showed greater returns than an equal area planted to wide double rows.

7. LEGUMES AS A SOIL BUILDER FOR TRUCK CROPS

Miller

This experiment contained the following treatments:

(1) Check—no improvement crop.

(2) Soy beans.

(3) Austrian winter peas and oats.

(4) Soy beans and Austrian peas and oats.

(5) Stable manure at rate of 15 tons per acre.

Irish potatoes were planted uniformly over the entire plots and fertilized with a 4-12-4, at the rate of 800 lbs. per acre plus 200 lbs. of nitrate of soda as a top dressing.

The soy bean plots produced the largest yield of U. S. No. 1 potatoes and were followed by the stable manure plots. The combination of soy beans as summer crop and the Austrian winter peas and oats and a winter crop did not produce any larger yield than did the check where no legume crop was used. The Austrian winter pea and oat plots showed the lowest yield of any of the treatments. The Austrian winter peas and oats were turned under three weeks before the potatoes were planted.

8. BREEDING OF ONIONS AND OTHER BULB CROPS

Miller

So far most of the time devoted to this project has been given to the selection and breeding of Creole onions. This work was started in the fall of 1929, by selecting as nearly uniform onions as could be found from the best sources in the state. To date the method used in breeding has been to inbreed by selfing and to discard the off-type bulbs. After the first generation of inbreeding, many of the selection were considered worthless for further study and were discarded. The off-type bulbs in the better strains were thrown out and the desirable bulbs were stored to determine their keeping quality and for further inbreeding. The different selections showed a marked variation as to color of bulbs and tops, size, shape, number of splits and keeping quality. The bulbs have now been planted to the field for the second generation of inbreeding.

9. SELECTION AND BREEDING OF THE CAYENNE AND TABASCO PEPPERS

Miller

Since starting this project, in 1929, two generations of inbreeding and selection have resulted. To date three strains of Cayenne and one strain of Tabasco have been isolated which growers and manufacturers of pepper products consider superior to any strains they have had before. All of the other strains except the ones mentioned above will be discarded. While these strains are now relatively pure, further inbreeding will be practiced to fix the type. So far very little, if any, vigor has been lost by inbreeding. Crossing between similar strains of Cayenne will be made to determine if additional vigor can be obtained.

10. SWEET POTATO INVESTIGATIONS

(a) FERTILIZER INVESTIGATIONS

Miller-Kimbrough

This is a study of the fertilizer requirements of the Porto Rico sweet potato, planting distances and different sources of seed potatoes. Fertilizer was applied at the rate of 600 pounds per acre, except in the rate of application test. Plants were set 12 inches apart in rows 3½ ft. apart. Plats are located on the bluff land type of soil at L. S. U.

In the nitrogen test 2% was found to be as profitable as higher rates of application. Slight increases were obtained from phosphate up to the application of 12%. Potash applied at the rate of 2% was as profitable as the higher rates. A 4-8-4 fertilizer was aplied at the rate of 0 to 1000 pounds per acre. No significant difference in yield was obtained from rates varying from 200 pounds to 1000 pounds per acre, with the yield from 600 pounds being the highest. Concentrated fertilizers, as Ammophoska and nitrophoska, were as good sources of plant food as a standard 4-8-4.

The results of the spacing test, where intervals varied from 9 to 21 inches, showed that the 12-inch spacing was best, closely followed by the 15 inch spacing.

The source of seed test showed considerable variation in yields, but these were not consistent for a two-year period.

(b) A STUDY OF THE MUTATIONS OF THE PORTO RICO SWEET POTATO

Miller

Since the sweet potato plant almost never produces viable seed in the United States, it is believed that many of our varieties originated in this country by means of somatic mutations. It is, therefore, the purpose of this experiment to study, first, the kinds and frequency of the mutations; second, the difference in chemical composition of the mutations found;

and third, the progeny from high yielding hills to determine if the sweet potato mutates for high yielding ability as it does for color and shape.

To date the following mutations have been collected: (1) white skin ;(2) white flesh; (3) white skin and flesh; (4) pink skin and white flesh; (5) white striped skin; (6) gold skin; (7) purple skin; and (8) vineless or bunch.

The Porto Rico normally has light yellow skin and a flesh color of orange yellow to salmon.

Chemical analysis of the white skin and white flesh mutation showed that it was higher in water and starch and lower in sucrose and glucose than the normal Porto Rico.

(c) STORAGE INVESTIGATIONS

Kimbrough

A study is being made of curing and subsequent storage of sweet potatoes. Comparisons will be made of moisture contents and shrinkage of cured and uncured potatoes during storage. Potatoes dug at different times and which are different in moisture content at the start will be used in this work. The relation of moisture content of potatoes at digging to the advantages of curing will be especially studied.

B. FRUITS

1. SUMMER APPLES

Miller

The summer apple orchards planted at the North Louisiana Experiment Station at Calhoun, Louisiana, and at the Louisiana State University Agricultural Experiment Station have developed satisfactorily. The trees at Louisiana State University are much larger than those at Calhoun. This is partly due to the drouth in North Louisiana during the summer of 1930.

2. ORANGE INVESTIGATIONS

(a) FERTILIZER INVESTIGATIONS WITH ORANGES

Miller-Kimbrough

This work is being carried on in the Buras district with the cooperation of parish agent C. C. Dethloff. A study of the effects of various fertilizer treatments on the growth and hardiness of trees and the yield and quality of the fruit produced is being studied. The work is being carried on in three different groves of different ages. The different ages of the trees at the start of the experiment were one, five and twenty years respectively.

The three phases of the problem to be especially studied are:

(1) Rate of application of fertilizer.
(2) The response of oranges to N, P and K.
(3) The effect of rate and time of application of potash.

(b) FERTILIZATION OF SATSUMA ORANGES

Miller-Kimbrough

The purpose of this investigation is to determine the response of satsuma trees to nitrogen, phosphorus and potash. This work is being conducted in a small grove of trees two years old at L. S. U. A few oranges were borne this year and the number of fruits on trees just prior to maturity were recorded. No difference in tree growth due to fertilizer treatment is yet apparent.

(c) ORANGE HARDINESS INVESTIGATIONS

Miller-Kimbrough

The work to be done under this project is a study of cultural practices with satsuma oranges in relation to winter hardiness. The effects of six different cultural treatments on ability to withstand injury will be studied in the field and in the laboratory. This study will be made at L. S. U.

3. PECAN VARIETY TEST

Miller

The object of this experiment is to test some new varieties as well as some of the standard varieties which are generally recommended for south Louisiana conditions. The trees have made satisfactory growth.

PLANT PATHOLOGY

TOMATO WILT

Edgerton-Tims

The two wilt-resistant tomatoes, Louisiana Red and Louisiana Pink, which have been developed at the Louisiana Experiment Station have continued to be popular. In 1930, over 2500 pounds of Louisiana Pink seed were produced and sold by a seed grower in California.

During the past two years, the comparative yield of these varieties and certain other standard varieties on wilt-infested soil at Baton Rouge is shown in the table below. The yield of all tomatoes in 1930 was very unsatisfactory on account of the drought.

Results of tomato variety tests on wilt-infested soil at Baton Rouge.

Variety	Yield per acre, tons	
	1930	1931
Louisiana Pink	2.76	8.34
Louisiana Red	2.17	7.81
Stone	.57	2.65
Marglobe	1.37	....
Norton	1.42	....
Earliana	.79	3.58
Kanora	1.29	....
Marvel	....	4.13

SUGAR CANE DISEASES

1. SUGAR CANE MOSAIC

Edgerton-Tims-Mills

Field tests to obtain data on the actual loss caused by the sugar cane mosaic under Louisiana conditions have been continued for a number of years. Replicated plots have been planted with mosaic-infected and healthy seedpieces. Results which have been obtained during three years are given in the table.

REDUCTION OF YIELD BY THE SUGAR CANE MOSAIC

Variety	Condition of seed	Yield in Tons Per Acre		
		1929	1930	1931
Striped	mosaic	17.9	16.2	....
	mosaic-free	19.3	17.1	....
POJ 36M	mosaic	25.0	29.6	26.5
	mosaic-free	26.3	30.5	28.3
POJ 36	mosaic	23.1	....	....
	mosaic-free	25.4	....	....
POJ 234	mosaic	27.6	....	....
	mosaic-free	29.3	....	....

Investigations over a number of years show that the direct losses from mosaic on the varieties tried is in the neighborhood of ten per cent.

Some interesting information on the behavior of the mosaic disease in different cane varieties has also been obtained. It has long been observed that tolerant varieties, like POJ 213, remain remarkably free of the mosaic disease. Planting tests using seedpieces known to be infected with the disease have been conducted for several years. For a number of years, these diseased seedpieces have produced a remarkably high percentage of healthy shoots. Furthermore, it was noticed that diseased plants would apparently throw off the disease during the growing season. During the past two years, however, a condition has developed which is somewhat different. At Reserve, it was noticed that fields of POJ 213 were showing an extremely high percentage of mosaic. It was further noticed that varieties like Co 281 which had previously been practically free of the disease were becoming infected. When planting tests were made with diseased stalks from Reserve, it was found that these stalks produced nothing but diseased shoots. This strain of mosaic behaves differently from the common strain which has occurred generally throughout the State. This strain is also appearing now in other parts of the State.

2. RED ROT

Edgerton-Tims-Mills

The red rot disease has become a serious problem, especially on certain varieties. Investigations have shown that POJ 213, POJ 36M, and CP 807 are very susceptible, while POJ 234 and Co 281 are highly resistant. In the field, POJ 213 seems to be injured more severely than the other varieties. In the spring of 1931, the stands of POJ 213 in many fields were injured to quite a serious extent. The relation of this disease to stubble deterioration is definitely established.

3. POKKAH-BONG

Mills

The Pokkah-bong disease occurs to a greater or lesser extent throughout the state. POJ 234 is the only commercial or promising variety which is seriously affected. The fungus, *Fusarium moniliforme,* which is generally recognized as the causal organism occurs quite commonly on a number of cultivated plants. In inoculation tests, the disease has been produced with cultures obtained from corn and onion as well as from sugar cane.

4. ROOT ROT

Tims

It is generally recognized that the fungus, *Pythium arrhenomanes,* is one of the organisms concerned in the root rot problem of sugar cane. This organism attacks the younger roots especially during the winter and cooler portion of the spring. Inoculation tests in metal drums in the field have shown that shoots in infected soil grow very slowly during the cooler weather.

Pythium arrhenomanes also occurs on other plants, especially corn. Apparently, however, the root rot condition cannot be materially affected by leaving corn out of the rotation. Tests have shown practically as much Pythium root rot in fields in which corn had not been grown as in others.

It has been found that there are certain organisms in the soil, especially Actinomycete species, which are antagnoistic to Pythium. In sterilized soil, it has been possible to reduce the action of Pythium to a considerable extent by inoculating the soil with some of these organisms. Under field conditions, the results, as yet, have not been satisfactory.

SELECTIONS OF POJ 36M

Tims-Edgerton

In order to determine whether it is possible to select a high sucrose strain of POJ 36M, individual stalks were selected in the fall of 1929 and planted. As a check, individual stalks of POJ 36 were also used. In the fall of 1930, many of these selections were planted in larger plots. Analyses have been made during the three years. While a few of the selections have consistently shown high sucrose, most of them have varied to a considerable extent.

ROOT DEVELOPMENT OF SUGAR CANE

Edgerton-Ryker-Ellis

Investigations carried on in 1930 and 1931 have shown the importance of the roots on the seedpieces and on the stubble pieces. These roots are particularly important to the early growth of cane in the spring.

The lowest temperature at which cane roots and shoots will grow varies to a slight extent with different cane varieties. For most of the varieties, this temperature varies between 54°F and 58°F. Co 281 will not start at as low a temperature as will some of the other varieties.

As about 90% of the cane roots occur in the upper fourteen inches of soil, deep cultivation should not be practiced after the cane roots grow out in the middles. The soil should be cultivated deeply only before the roots have developed.

BEAN BLIGHT

Person

The bean blight has been very common and serious in Louisiana during 1929 and 1930. A considerable part of the infection, in the neighborhood of 85%, has been of the Halo blight type *(Bacterium medicaginis* var. *phaseocola)* and the remainder the common blight *(Bacterium phaseoli).* The organisms causing these diseases are carried over from year to year on the seed. Seed from no section of the country seems to be free of infection. No seed treatment yet tried has been efficient enough to be of value.

ROOT ROT OF BEANS

Person

Root rot of beans has been a serious trouble in the alluvial sections of the State. Not much of the disease occurred in Livingston and Tangipahoa parishes but in Terrebonne, it was particularly severe especially in the heavy, poorly drained soils. A number of organisms including species of Rhizoctonia, Fusarium, and Pythium have been isolated from the diseased plants. In inoculation experiments, the species of Rhizoctonia and Pythium were shown to be pathogenic. These organisms occur naturally in the Louisiana soils and are not brought in on the seed. As these diseases develop more readily in soils with a high moisture content, only well-drained soils should be used.

STRAWBERRY DISEASE INVESTIGATIONS

Plakidas

Four years of spraying experiments have shown that the leaf blights of the strawberry—leaf spot *(Mycosphaerella fragariae)* and sorch *(Diplocarpon earliana)*—can be effectively controlled by spraying with 4-4-50 Bordeaux about every ten days, beginning the first week in January and continuing until about the first week in March. The marked increase in yield by the sprayed plants makes this practice economically practicable. In 1930, the yield of the sprayed plats was 107¼ crates per acre more than that of the unsprayed. In 1931, due to the longer picking season and the bigger crop, the difference in yield between the sprayed and unsprayed was even greater. The sprayed plats yielded 348 crates per acre and the unsprayed ones 129, or a difference of 219 crates per acre in favor of the sprayed.

Tests showed that Bordeaux spray does not injure the opened blossoms. The percentage of blossoms setting fruit was found to be practically the same on both the sprayed and unsprayed plats.

Temperature studies showed that the optimum temperature for *Diplocarpon* is about 10°F higher than that for *Mycosphaerella*. These findings are in agreement with the actual conditions in the field. In Louisiana, the leaf spot is primarily a cool weather disease, being at its worst during the winter and early spring months. The scorch, on the other hand, is most prevalent during the warm months.

Infection experiments have shown that with both *Mycosphaerella* and *Diplocarpon,* infection takes place primarily, if not wholly, through the under leaf surface. The former fungus enters the leaf tissues through the stomata; the latter by direct penetration of the epidermis.

Inoculations with the bud nematode, *Aphelenchus fragariae,* resulted in about 90% of dwarf plants. These findings are in agreement with those of Brooks, from Florida. From yield tests, it appears that the dwarf disease is of relatively minor economic importance in Louisiana because the nematodes are inactive during the winter months, so that dwarf plants recover during the winter and produce a fair crop. It is estimated that the reduction in yields due to dwarf does not exceed 1%.

Several strains of *Pythium,* a *Phoma,* a *Fusarium,* and a *Rhizoctonia,* which were isolated from decaying strawberry roots proved to be pathogenic to strawberries, to a greater or less degree, when plants were grown in pots on soil inoculated with these organisms. What effect these fungi have on the plants under field conditions has not been determined.

Weather conditions have been decidedly unfavorable during the picking season for the development of berry rots, and so the losses due to fruit rots have been insignificant during the past two years. It is of interest to note, in this connection, that the gray mold (*Botrytis*) rot, which ordinarily is practically absent from the Louisiana berry fields, has been the prevailing berry rot during the last two years, over 60% of all the berry rotting being caused by this fungus.

Another berry rot which was noted for the first time in Louisiana this year, was caused by a Sclerotinia fungus, probably *S. sclerotiorum*.

RUBUS ROSETTE

Plakidas

The limiting factor in commercial growing of blackberries and dewberries in Louisiana is the rosette or double blossom disease. It was in the hope of discovering the cause and possible control of this disease that this project was undertaken.

The investigations thus far have shown that a fungus is found constantly associated with the disease. This fungus can be easily isolated from the inside of rosette blossoms, but has never been isolated from healthy ones. Mycelium and spores of apparently the same fungus are found in the affected blossoms between the floral elements and between the scales of the buds.

Inoculations were made with this fungus on healthy blackberries this year. So far the disease has not been reproduced artificially, but it is rather too early to tell, for the disease does not appear in its typical form until spring.

A spraying experiment appears promising. It was reasoned that if a fungus is resonsible for the disease, infection should be prevented if the plants are kept sprayed regularly with some fungicide. Accordingly, a lot of blackberries and dewberries which were known to be severely affected with rosette have been kept sprayed regularly with 4-4-50 Bordeaux since last May, and another set of the same lot have been left unsprayed as check. Thus far, (January 11), the sprayed plants have been completely free from the disease, while many canes of the unsprayed check plants show symptoms of rosette.

DYING OF PINEAPPLE PEAR TREES

Plakidas

For the past several years, dying of pear trees has occurred in different parts of the state, but chiefly in the Florida parishes. This disease, which may affect trees of any age, appears to be typically a root rot. The large roots and the base of the trunk above ground become affected, and the tree fiinally dies.

Among the organisms isolated from affected trees are cultures of a *Sphaeropsis* sp. and of a basidiomycete, probably *Clitocybe parasitica.* Inoculations with the former resulted in the production of cankers, but these are not typical of the disease as it occurs naturally. The *Clitocybe* fungus has been reported from other states as causing root rot of apples and other trees, and it is likely that it is also the cause of the killing of pears in Louisiana. Inoculation experiments are being carried on with this and other organisms.

ANIMAL PATHOLOGY DEPARTMENT

ANAPLASMOSIS

Morris

Several cases of anaplasmosis developed on the University farm during the month of October, 1927. One survival of this outbreak was retained for experimental purposes and is still under observation. This animal was a carrier of the disease for a period of three and one-half years, as demonstrated by blood transfusions into susceptible animals.

Fly transmission of anaplasmosis from infected to susceptible animals has been studied. The large black horse fly, *Tabanus atratus,* and the horn fly, *Haematobia serrata,* were used as possible vectors. The tests were conducted in well screened rooms and the interrupted method of feeding was used. The results of the tests carried on during 1930 and 1931 were negative. All test animals were observed for a period of at least one hundred days after attempted fly transmissions. All negative animals were then inoculated with a virulent strain of anaplasmosis to demonstrate the absence of immunity to the disease.

BLINDNESS IN CHICKENS

Morris

The condition known as blindness in chickens continues to be a serious problem to the poultry industry. As high as forty per cent of some flocks are affected with this condition. It may be found in flocks that receive the best care and attention as well as the neglected ones. All attempts to produce or transmit blindness experimentally have given negative results.

SANTONIN

Morris

The report of the tests with santonin as an anthelmintic for swine was published in the Journal of the American Veterinary Medical Association, Vol. LXXVIII, N. S. Vol. 31, No. 4, April 1931. The results seem to indicate that santonin is a very efficient anthelmintic for round worms in swine when given in small doses if followed by a saline purgative. Large doses were non-toxic.

INTESTINAL PARASITES IN HORSES AND MULES

Morris

Investigations concerning control measures for intestinal parasites in horses and mules have been carried on for a period of four years. It has been found that colic can be practically eliminated by the control of parasites. A report of this work was published in the Journal of the American Veterinary Medical Association, Vol. LXXX, N. S. Vol. 33, No. 1, January, 1932.

PARASITOLOGY

COCCIDIOSIS IN FOWLS

Mayhew

Single Comb Rhode Island Red chickens were used in the experiments covered by this report. All the eggs were obtained from the same flock of hens which was free from white diarrhea. They were incubator-hatched and the chicks reared in a battery brooder under closely controlled temperature and sanitary conditions, and all received the same brand of commercial feed during the time of the experiments.

A portion of the experiments has been concerned with the effects of the Coccidiosis upon the chickens. The difference in weight has been found to be the most outstanding definitely measurable difference betweent chickens inoculated with Coccidia and controls. Three lots have been inoculated during the seventh week in which there were 30 inoculated and 22 control females, and 30 inoculated and 32 control males. At six weeks of age the inoculated groups were approximately the same weight as the controls in both males and females. At eight weeks of age the males weighed 21.8% less than the controls. This difference decreased to 7.3% at 20 weeks. The inoculated females were 17.8% less than the controls at 8 weeks, the difference decreasing to 2.8% on the 20th week. At no time between the 8th and the 20th weight do the inoculated chickens equal or exceed the controls. When the inoculation is made during the 12th and 13th weeks the same general results are obtained, the inoculated males being 20% less and the females 20.7% less than the controls on the 15th week. These differences decrease to 10.1% in the males and 91.1% in the females on the 24th week. These differences do not include the loss by death.

Four lots of chickens have been used in checking the effects of powdered buttermilk in the treatment of Coccidiosis. Approximately half of each lot was inoculated on the day following the 6th weekly weight. The regular ration was fed until the 7th day after the inoculation, when both the inoculated and the controls were divided into two groups, and one group of each given the commercial mash to which 35% powdered buttermilk was added for about 2 weeks, while the other group was given the the regular mash. A comparison of the weight records does not reveal any acceleration in the rate of growth of the inoculated chickens receiving the buttermilk which would enable them to regain their loss in weight due to the disease. Neither is there any consistent acceleration in the rate of growth of any group receiving the buttermilk when compared with the ones receiving the regular mash. These experiments are being continued to obtain additional data.

During the progress of the experiments on Coccidiosis 27 cases of paralysis have developed. These chickens have been reared under the same conditions and received the same feed as the others. There is usually a marked atrophy of the muscles on the limb affected. Death sometimes occurs within a week, while other individuals have lived several weeks or even months in a paralysed condition. Two have nearly completely recovered, one a male and one a female. The fecal examination records reveal the fact that 13 of the 27 cases of paraslysis showed no infection with Coccidia or intestinal parasites. The accuracy of the examinations is suggested by the fact that 191 control chickens were raised in 16 lots under the same conditions without infection.

POULTRY

Storage of Louisiana Eggs

Upp

This department has co-operated with Swift & Company of New Orleans for the past five years on the problems involved in the cold storage of Louisiana eggs. The results of these experiments justify the following statements:

Eggs produced in Louisiana under practical conditions, if properly cared for and marketed while fresh, will store successfully for six to eight months under commercial storage conditions. The average per cent loss on such eggs has been 1.5% to 3% including those broken in handling.

Louisiana eggs, when properly produced and cared for, are practically equal to eggs produced in other sections of the U. S. when stored under identical conditions.

The occurrence of olive-colored or dark yolk eggs need not be a serious problem with eggs produced in this state. Excessive feeding of cottonseed meal will cause olive yolks. It therefore should not be used in laying rations in amounts exceeding 5% of the total feed consumed during the season when eggs are stored, if there is any chance of the eggs being held more than two weeks. It is a good protein supplement for chickens and may be used more liberally at other seasons. Excessive feeding of rape, shepard's purse, green alfalfa and probably certain other green feeds should likewise be avoided during the storage season.

Tests have demonstrated that olive-yolked eggs can be used successfully for cooking, but due to the decidely unsightly appearance of such eggs when broken out raw, *they cannot be sold,* and hence are an absolute loss. The olive yolks regain a bright yellow color when cooked.

Bacteriological studies have not revealed any bacteria, nor any mold that is particularly associated with olive yolked eggs.

This past season eggs that were produced during the latter part of June were stored satisfactorily. These eggs had been subjected to routine good care and were about four days old when placed in storage.

The practical application of the results of this project is illustrated by the experience of a nearby commercial producer. This poultryman had not dared to attempt storage of his eggs until he learned of the results of this experiment. Based on this knowledge he stored 3,000 cases of eggs this past season with very satisfactory results both as to quality and as to price received for the eggs when removed from storage. It is planned to issue a bulletin during the current year which will give in detail the results of the five year's work.

RICE BY-PRODUCTS FOR LAYING HENS

Upp

Rice bran, rice polish, and brewer's rice have been used in various proportions and combinations in laying rations during the past five years. The data accumulated justify the following summary:

(1) Rice by-products frequently lower the cost of poultry feeds.

(2) The use of rice by-products in laying ration is an efficient means of utilizing feed produced abundantly in the state.

(3) Rice-fed hens have produced as well as hens on standard rations when rice products comprise up to 20 to 25% of the total ration.

(4) Rice bran or rice polish, or the two together, may be used to replace wheat by-products, ground oats, or not to exceed half of the yellow corn meal, in laying mashes.

(5) Brewer's rice may comprise as much as one-third of the scratch grain. Because of the small size of the particles it is advisable to trough feed scratch grain which contains brewer's rice.

(6) The eggs from rice-fed hens are excellent for market and they keep well in storage.

(7) The use of rice by-products in the rations of breeding birds does not impair the fertility nor the hatching quality of the eggs produced.

(8) The body weight of laying hens receiving rice by-products in the ration is normal.

RICE BY-PRODUCTS FOR GROWING CHICKS

Upp

Rather extensive tests have revealed that rice by-products may be used successfully in rations for chicks as well as for hens.

Rice bran as 10 to 15% of the ration has given particularly gratifying results. There is some evidence that rice bran has an especial value because of its mineral content. Rice polish has also been used with satisfactory results. Formulas for chick rations and laying rations containing rice by-products may be obtained, by request from the poultry research department.

DOES HEAVY LAYING AFFECT HATCHING RESULTS

Upp

Three years' careful study of the individual egg production records and hatching records of breeding hens has shown that heavy laying prior to the hatching season is not as a rule injurious to the breeding ability of a hen. The fertility and hatchability records of Leghorn hens and of dual purpose hens that had laid a large number of eggs prior to the hatching season were equal to those of similar hens that had laid only a few eggs prior to the hatching season. The chicks of high-producing hens lived as well as those from hens that had laid appreciably less prior to the hatching season.

During the past two years approximately half of the hens on this experiment were "forced" by the use of all night lights and supplementary feeding of wet mash each day. Preliminary information indicates that this type of "forcing" is not detrimental to fertility and hatchability. This experiment is being continued as the data available are too meager to be definitely conclusive.

SHRIMP MEAL A PROTEIN SUPPLEMENT FOR HENS

Upp

Shrimp meal (or bran), a Louisiana product, shows promise of being a good protein feed for laying hens. Tests conducted the past two years indicate that shrimp meal may be used to replace meat meal in laying rations, with satisfactory results. Further tests are being made before specific recommendations are issued. Tests with shrimp meal as a protein feed for chicks are also planned. A considerable number of poultrymen in south Louisiana use this product in laying mashes and obtain good production with it.

SIMPLE VS. COMPLEX RATIONS

Upp

The farmer often feels that the laying rations recommended by Experiment Stations are too complex. To test simple rations vs. more complex ones, pens of layers have been fed on these types of rations for two years. These tests indicate that birds will produce much better on "complex" rations than on simple ones. They also demonstrate, however, that a well-balanced simple ration will give fairly good production *if an adequate protein feed is a part of the simple ration.* Recommended rations will be given upon receipt of requests.

KEEPING CHICKENS IN CONFINEMENT

Upp

To combat poultry diseases and parasites many poultrymen of Louisiana have adopted the practice of raising chicks in houses with wire floors and of keeping them off the ground entirely for at least eight to twelve weeks. Others have gone even further and keep the laying hens confined to the house. Two years ago an experiment was started in which different lots of chickens grown and kept under varying conditions of confinement. The results of this experiment, to date, are not conclusive. This past year no significant difference was noted in the egg production or hatching results of hens in the various lots. The chicks grown in confinement on wire floors have had less mortality and have grown more rapidly than have chicks which were raised otherwise.

MITE CONTROL

Upp

Tests of the efficiency of "Crewood Oil", a southern by-product of wood distillation, in the control of mites in the poultry house have been underway for two years. The results to date indicate that this material is satisfactory for this purpose. Further trials are planned to test the durability of the treatment and the concentration or strength of solution needed for efficient control.

SUGAR CANE

During the biennial, all work as outlined and approved for sugar cane has been pushed along. Through the able assistance of Mr. Simon, who was appointed at the beginning of the period, much more information has been secured and passed on to the industry.

VARIETIES

Taggart-Simon

Every year new varieties of seedling canes were secured from the Office of Sugar Investigations.

The "28" series produced some very interesting canes, two of them showing great promise of early maturity and satisfactory tonnage. Neither of these canes has as yet shown any signs of troublesome diseases which infest sugar cane in Louisiana. Both varieties are now under intensive cultivation, and seed cane of one of them has been placed on all of the test fields for propagation.

The "29" series showed an unusual number of promising canes, some of them of good diameter, and early maturity. We have had these cane varieties now under test for one year, and have not attempted to carry any of them further than the increase stage of production. Should they hold up in their performance through the current year, then the best of them will go forward to the plantation test fields.

In 1930, two new varieties of sugar cane, which have been thoroughly tried out by the University and the Government Station, were released to the sugar planters. One of these canes, Co 281, though not an early maturnig cane, shows ability to make a good tonnage of rich cane early enough in the milling season, to warrant full consideration as a plantation cane. The other variety C. P. 807 grows heavy tonnage all over the state, but is slow in maturity and should be planted in small acreage, until more is known about its habits of growth, maturity, and milling qualities.

One other variety Co 290 has attracted a great deal of attention. Here at Baton Rouge, this cane has done well. It like C. P. 807 is not an early maturing variety, and should not be planted on extra fertile soil. On heavy soil and soil of medium fertility, this cane seems to be able to make tonnage and sucrose with a minimum of attention. The variety has been put out for test on a number of plantations. It has not yet been released for plantation use.

ROTATION

Taggart-Simon

Data gathered during the past two years confirm our last report to the effect that the use of legumes in a sugar cane rotation is the first essential to economic sugar production in Louisiana. Our records now show that a crop of legumes which was turned under in 1927-28 in comparison with a crop of the same legume when harvested for hay continues to show its effect in increased yield in 1931. We strongly recommend that no land be planted to sugar cane which has not had at least one crop of legumes grown on it and this legume crop turned under. Our rotations indicate that one crop of legumes (soybeans) grown and turned under in an ordinary sugar cane rotation in Louisiana on land which has been improved or built up is sufficient to maintain production. That two continuous years of legumes (beans or peas), while seeming to increase the yields of crops which follow in the rotation will not prove profitable, unless the soil in the beginning was in a rundown state.

If a planter has allowed his land to go backward, and if his yields, after fair cultural treatment are found to be unsatisfactory, it will no doubt prove highly profitable to him to crowd as many legume crops into his rotation as is possible, until he has built back the organic matter, and fertility of his soil. Once this stage is reached, then we believe that he can hold his lands up to a profitable yield basis, most economically by turning under one good crop of beans per rotation period.

FERTILIZERS

Taggart-Simon

Under our system, we continue to find that it is not profitable to fertilize plant cane. We do find that it is, on the average, profitable to fertilize stubble cane, according to the treatment which the land has had. Not more than thirty-six to forty pounds of nitrogen should be applied to first or second stubble cane. The choice of materials for furnishing this nitrogen is wide, and all planters should buy that source of well known nitrogenous material which gives him the desired plant food at the smallest cost per pound of nitrogen.

In general, we do not find that any other commercial fertilizer is profitable when crops of legumes have been turned under regularly in our rotation. Heavy crops of beans when grown on land and turned under render quantities of mineral plant food available. We have several tests, particularly on plantations near Lafayette and Bunkie, where, while phosphate was required on one plantation on which the soil was low in organic matter, adjoining lands rich in organic matter failed to respond to phosphate. This is another strong argument for the proper use of legumes in all sugar cane rotations. There are some soils where it is known that phosphate will pay, and one strip of land along the western edge of the cane belt where phosphate is necessary in order that nitrogen may pay. We recommend to the planters particularly those on the river and bayou soils, to fertilize with nitrogen until they have tested their soil as to phosphate requirements.

HARVESTING

Taggart-Simon

During the several years in which we have studied the POJ canes, we have found that during dry warm weather, shortly after these canes have been cut for the mill, say after twenty-four hours, they suffer a loss of sucrose and a drop in purity. After that first drop, they may not show any measurable loss for two or three days when deterioration may set in at such a pace that good canes may become unfit for sugar making. This is not a rule without exception, weather conditions have a great deal to do with the matter. During wet weather without much sunshine, canes keep better than during bright warm weather, and during cold weather canes keep much better than during warm weather.

While there are notable exceptions to the rule, it holds well enough to justify every effort to mill canes as close behind the cutter as is humanly possible. Particularly is this true in the case of immature cane. Cane that is low in sugar content is much more prone to deterioration than is rich cane.

The station recognizes the great advantage to the industry that it would be to find new varieties which would not be so prone to this deterioration. In work with new canes, the point is constantly in mind, and some data have been secured that indicate that one or two varieties now in hand may prove better adapted to Louisiana harvest conditions than the POJ canes.

CORN ON THE SUGAR PLANTATION

Taggart-Simon

Tests at the Baton Rouge Station show that in a comparison where corn was included in the rotation as against no corn in the rotation, a small increase in yield of cane was shown for the "no corn," but not enough increase to justify the elimination of corn.

There has been a great deal of interest shown in the question of fertilizers for corn. This station finds that it is a profitable practice to fertilize corn following stubble cane. One hundred pounds of nitrate of soda on corn following stubble cane gave 11.6 bushel increase over no fertilizer. (This was a profitable investment).

Two hundred pounds of nitrate of soda on corn following stubble cane gave a 14-bushel increase over no fertilizer (the extra hundred pounds of fertilizer did not pay for itself).

Fertilizer after one and two years of beans when turned under did not pay for the investment. Corn following one year of beans turned under and not fertilized made as much as corn following two years of beans turned under.

SUGARCANE TEST FIELDS

SEASONS OF 1930 AND 1931

FIELD EXTENSION WORK

Gouaux

Sugarcane Extension work in the sugarcane growing areas of the State is conducted mainly in cooperation with County Agents. In this line of work, cane farmers are assisted with existing field problems, and improvements in the system of farming are made by giving information on these problems and by practical field demonstrations. The information and data used in sugarcane Extension work is based on proven results obtained at the Louisiana Sugar Experiment Station at Baton Rouge and also from supervised tests; demonstrations and test fields located in the various cane-growing localities of the cane belt. During the seasons of 1930 and 1931, an outlined program of the most important projects was made, and the work was conducted during the four periods of the year as given below.

(1) *Winter period.* Information and advice were given on preliminary cultivation operation, including stubble-shaving, scrapping plant cane, off-barring, drainage and deep early work.

Fertilizer demonstrations. During the season of 1930, a series of 17 Nitrate of Soda and Superphosphate demonstrations, on a five acre basis, was conducted with planters of the cane parishes. The results of this work were prepared in the form of a mimeograph report and mailed to the cane farmers by the Louisiana State University Extension Service. A similar series of ten demonstrations was conducted during the 1931 season.

A series of 21 Potash tests on cane was conducted in 1931 in cooperation with the N. V. Potash My., and the results of this work are now being prepared.

Fertilization. Cane farmers were assisted with their fertilization programs on cane and corn. Information was given on the best and most economical fertilizers to use, and the proper time and method of application.

(2) *Spring period.* Recommendations on methods of cultivating cane and corn were made, based on methods of the Sugar Experiment Station.

Information on proper time of dirting early germinating and early suckering varieties of cane and late germinating and late suckering varieties of cane was furnished to the planters.

(3) *Summer period.* Information and recommendations on cane cultivation were stressed.

(4) *Fall period.* Recommendations given for proper land preparation and turning under of legumes.

Field cane varieties: Advice on fall cane planting; adapting varieties to proper soil types; proportions of varieties proper time and method of planting. This information was prepared in the form of an article and published in the American Sugar Cane League Bulletin.

Melilotus indica. This legume was recommended as a winter cover crop on fall plant cane. Information was given on *Melilotus indica,* as to rate of seeding, method of planting and method of handling in the spring.

A number of demonstrations have been started by County Agents in Iberia, St. Mary and Lafourche Parishes.

The resulting improvements from sugarcane Extension work are quite apparent in all section of the cane belt. In general, sugar planters are following better methods of land preparation and turning under of summer legumes. More intelligent use of commercial fertilizers for both cane and corn is in evidence in all sections. The planting of cane has been performed with more care and attention and also with a definite purpose of following out recommendations as pertaining to adapting varieties to proper soil types and proper time of planting. During the season of 1931, distinct progress was made in cultivating cane according to the method of the Sugar Experiment Station, and in each of the five sections of the cane belt there were a number of planters using the new method. In most cases it has been entirely satisfactory, and will be adopted for general field practice.

EXPERIMENT STATION TEST FIELD WORK

During the fall seasons of 1930 and 1931, new fall plant cane variety fields were planted at the six established Experiment Station test fields. The test fields, which are 2 to 2½ acres in size, were measured and laid off into one-twentieth acre three-row plots. The varieties were planted in checkerboard fashion of mostly five replications. The usual field planting method of two stalks and a light lap was uniformly used with all varieties.

Varieties planted in 1930; P. O. J. Nos. 36, 36-M, 213 and 234, C. P. Nos. 177 and 807, and Co. Nos. 281 and 290.

Varieties planted in 1931: P. O. J. Nos. 36, 36-M, 213 and 234, C. P. 807 and Co. 281 and 290, and introductory plantings of new seedlings from the Baton Rouge Sugar Experiment Station: C. P. 28-1, C. P. 28-11 and C. P. 28-70.

The variety fields are visited and inspected throughout the year at monthly intervals. Germination counts, growth measurements, observations on disease and insect pests and variety characteristics are made. The data and information are prepared in the form of monthly mimeograph reports, which are presented to a Contact Committee of the American Sugar Cane League and members of the Louisiana Experiment Station staff on sugar work. Summaries of these reports are published in the American Sugar Cane League Bulletin.

The results on Experiment Station test fields for the season of 1930, consisting of field and chemical data on four second stubble variety fields, six first stubble variety fields and six fall plant variety fields, located at Cinclare, Napoleonville, Reserve, Meeker, Franklin and Youngsville have been published as Louisiana Bulletin No. 226, Part I, "Sugar Cane Variety Test Fields". This bulletin was released to the planters of the state in July, 1931.

The test field variety work for the season of 1931 consisted of six fall plant variety fields, six first-stubble variety fields, three second-stubble variety fields, and one spring plant variety field; all located at the same test field locations, with the additional spring-plant field at Broussard.

RESULTS OF TEST FIELD VARIETIES FOR SEASONS OF 1930 AND 1931

In order to obtain comparative results of the varieties, the average results of plant, first and second stubble figures were calculated on a sucrose contract basis; according to the method used in Louisiana Bulletin No. 226. The results of these calculations bring out the information presented below.

P. O. J. 36 AND P. O. J. 213

In the plant cane tests, P. O. J. 36 was lower in sucrose and tonnage at Cinclare, Glenwood, Reserve and Meeker than P. O. J. 213. While at Sterling and Youngsville, P. O. J. 36 was higher than P. O. J. 213.

The first stubble results show that P. O. J. 36 and P. O. J. 213 compare very closely in sucrose and tonnage at the test fields of the alluvial soil section; while in the western area P. O. J. 36 is decidedly better.

The second stubble results show that P. O. J. 36 ranked ahead of P. O. J. 213; while P. O. J. 234 was third ranking variety.

The Youngsville second stubble averages show that the varieties were in the following order: P. O. J. 36, P. O. J. 213, P. O. J. 36-M and P. O. J. 234.

P. O. J. 234, CO. 281 AND P. O. J. 36-M

These varieties are being compared in this manner because they produced the highest sugar per ton yield. The averages of plant and first stubble indicate that P. O. J. 234 produced the highest sugar per ton yield, followed by Co. 281 and P. O. J. 36-M. Co. 281 was slightly higher in field tonnage than P. O. J. 234; while P. O. J. 36-M was lowest.

CANAL POINT SEEDLINGS

There are two Canal Point seedlings at the six established Station test fields. These two seedlings are C. P. 177 and C. P. 807. The results with C. P. 177 indicate that this variety on account of its low sucrose, poor ratooning and milling qualities is quite inferior to the standard field varieties, and therefore should be entirely discarded.

C. P. 807, which was released in the fall of 1930 for field planting, gave a very good performance in showing highest field yields as plant and stubble at all test fields. The sucrose content of this variety was entirely unsatisfactory at Cinclare and Meeker, where the averages show that it is consistently under P. O. J. 213. At Glenwood and Reserve, there is a little increase in yield of sugar per ton, comparing closely with P. O. J. 213. From a sucrose per ton standpoint, C. E. 807 made it best showing at Sterling and Youngsville, being much higher at these places than at the other test fields, and comparing favorably with P. O. J. 213.

The present data on C. P. 807 indicate that even in the Franklin and Youngville sections, where it made its best sucrose performance, general field plantings should not be made until it has been proven out by the factories that it can be utilized as a commercial field variety.

CO. 281

Co. 281 which was released at the same time with C. P. 807, has proven to be more of a general purpose cane, and according to the present data and information can be used as a field variety in all sections of the cane belt. This variety has given a better performance in the alluvial soil section than in the Teche and western areas of the state.

CO. 290

Co. 290, which is an unreleased variety, was on trial as plant cane at all of the Experiment Station test fields during the 1931 season. It has proven to be a cane of early and good germination, early suckering and excellent growing qualities, with large barrel stalks of low fiber content. The final results for the present season show that it produces field yields slightly under C. P. 807. It is also consistently lower in sucrose content than C. P. 807. The Co. 290 variety made its best showing from a sucrose standpoint at Glenwood, Sterling and Broussard; however, at each of these places it was lower in sucrose content than P. O. J. 213.

CYANAMID FELLOWSHIP

A. K. Smith

Work under a scholarship given by the American Cyanamid Company was continued. Studies on rate of application, time of application and combinations of cyanamid with superphosphate were done. Here again it was found that cyanamid is a good source of nitrogen for sugar cane and that applications of cyanamid to stubble cane proved to be a profitable investment.

INVESTIGATIONS ON THE SUGARCANE SOILS OF LOUISIANA

O'Neal and Breaux

Soil investigations on the sugarcane soils of Louisiana, carried on under a cooperative agreement with the Division of Soil Fertility Investigations, U. S. Bureau of Chemistry and Soils, were started in February, 1929. Since the 1930 Annual Report did not enumerate the activities, a brief outline of the projects will be given.

RECONNAISSANCE SURVEY

The reconnaissance survey was made to determine the distribution of the principal soil areas and the dominant soil types of each. More detailed surveys of each district will be made from time to time. This important work is the foundation of any fertility program.

DETAILED SOIL SURVEYS

Detailed soil surveys of localities where fertility test fields were to be located were necessary in order that the importance and distribution of the soil series and types might be determined. During 1930 surveys were made of the Mandalay and Crescent Farm Areas near Houma, Cinclare Area, Cinclare, and Belle Terre Area near Donaldsonville. In addition, detailed surveys on a large scale were made of the variety test fields at Cypremort and Raceland. Other soil surveys will be made as time permits.

FERTILITY TEST FIELDS

The Sugarcane District of Louisiana is made up of five major soil areas. Since these areas embrace soils possessing different characteristics, depending upon the seiments from which they have been formed and the forces of nature to which they have been subjected since deposition, it seems logical to believe that they would require different fertilizer treatments. Consequently test fields have been laid out on uniform bodies of the more important and extensively developed soils of each area. While averages of many sea-seasons' work may be necessary before definite conclusions may be drawn, the trends are important and interesting. The results for the two years, 1930 and 1931, do not justify the recommendation of any specific analyses for the different soil types, but they do tend to show the limiting requirements to be mixtures containing 12 per cent or more of nitrogen and 4 to 8 per cent phosphoric acid and potash. The total amount of plant food of each mixture applied to the cane was 60 pounds. Among the highest yielding mixtures were 20-0-0, 16-0-4, 16-4-0, 12-4-4, 12-0-8 and 12-8-0, stated in the order of nitrogen (N), phosphoric acid (P_2O_5), and potash (K_2O).

The results of the experiments on Yazoo very fine sandy loam, the most extensive type of the Mississippi alluvium, First Bottom soils area, tend to show that mixtures with 12 per cent nitrogen and either 8 per cent phosphoric acid or 8 per cent potash, or a complete mixture containing 12 per cent nitrogen, 4 per cent phosphoric acid and 4 per cent potash, produce consistently high yields of cane and sugar per acre. On bodies of Lintonia silt loam of the Mississippi alluvium, Terrace soils area, the highest yields of cane and sugar in 1930 on POJ 213 first stubble were obtained from nitrogen alone, but in 1931 with POJ 36 first stubble the highest yield was from an 8-0-12 mixture. More results are required to determine the best average mixture for this soil type. The nitrogen and potash mixtures, as a whole, gave higher yields than combinations of nitrogen and phosphoric acid. The Yahola very fine sandy loam of the Red River area also responds best to the higher nitrogen applications, but small amounts of phosphoric acid or potash tend to increase the yields of both cane and sugar. The mixtures 16-0-4 and 16-4-0 have given consistently high yields.

The results from a single experiment started in 1931 on Franklin very fine sandy loam indicated that nitrogen alone was most needed, though consistently high yields were obtained from the 16 and 12 per cent nitrogen mixtures with 4 to 8 per cent phosphoric acid or potash.

In addition to the tests made on the various soil types to determine the best fertilizer mixtures, a test to determine the rate and source of nitrogen likely to give the best results was also started. Four rates, 20, 40, 60 and 80 pounds of nitrogen per acre, were used—the more common nitrogen carriers, sulphate of ammonia, nitrate of soda, cyanamid, calcium nitrate and Calurea, being employed. The results for the one experiment in 1930 seemed to indicate that 40 pounds of nitrogen per acre was most profitable for first stubble on land that had a good cover crop of soy beans turned under. There seemed to be but little difference in the action of the different carriers of nitrogen.

By referring to the bulletin, "Soil Fertility Investigations Sugar Cane District of Louisiana," published by the Station in 1931, a better understanding can be had of the different fertilizer mixtures included in this report.

RELATIONSHIP OF SOIL TYPE, PH, SUGAR CONTENT OF SUGARCANE AND TONNAGE

During 1929 and 1930, an exhaustive study of the pH reaction of the more important soils of the district was made. The results indicate that while there is a correlation between pH and soil type, there is practically no relationship between tonnage, sucrose content of cane and pH reaction.

THE INFLUENCE OF SOIL TYPES ON THE GROWTH AND YIELD OF SUGARCANE

The growth of sugarcane on different soil types of the same area has been carefully observed. The results of experiments carried out on controlled areas seem to indicate that this project, which will be continued, may prove of great value.

OBSERVATIONS OF UNUSUAL CROP CONDITIONS ON RESTRICTED SOIL AREAS

Throughout the Cane Belt, small areas are found where cane growth is below normal. Many of these bodies seem to be closely associated with soil type differences and the poor growth due to some pecularity of the soil profile. A study of many of these areas has been under way and will be continued as it is hoped such investigations will throw some light on a better method for handling certain soil types.

The work reported on by Mr. O'Neal and Mr. Breaux has been done in cooperation with the Bureau of Chemistry and Soils of the U. S. Department of Agriculture.

The work reported by Mr. Smith, Dr. Whitcomb and Mr. Stoneberg is being done in cooperation with the U. S. Bureas of Entomology and Plant Industry. These men and their associates have been detailed to this Station for the purpose of carrying on investigations that are of interest not only to Louisiana, but to a part, if not all, of the South.

SPOTTED CUCUMBER BEETLE

In Louisiana the study on this species consisted of observations and experiments on its life history, seasonal habits, and control. The control experiments consisted of trap crops during the winter and early spring, and insecticides which included arsenicals, fluosilicates, and potassium hexafluoaluminate.

In the Mississippi Valley and adjacent territory the seasonal habits of this species was made a special study during the seasons of 1930 and 1931. Life history experiments, with special reference to the number of broods produced, were conducted at Ames, Iowa, in 1931.

CHEMOTROPISM

A. Tomato fruitworm: The purpose of this study was to try to find a substance that would strongly attract the moths and might be utilized in destroying them before the females laid eggs. A large number of chemicals, mostly aromatic, were tested as possible attractants.

B. Cabbage looper: Experiments were conducted to determine if chemicals attractive to the adult or moth could be utilized in controlling the species by trapping the females before they laid eggs. Five chemicals and several of their fractions, previously found to be attractive to the moths of the looper group, were exposed in specially designed trap cages under field conditions.

STRAWBERRY INSECTS

Although strawberry insects do not have an outlined project status, the different pests of the crop receive some attention when they occur in damaging numbers and come to our attention. In 1930 an experiment was conducted with arsenicals used as soil treatments for the control of white grubs with special reference to their effects on the plants. In 1931 the strawberry weevil did rather severe damage to the crop over considerable areas. Several insecticides including pyrethrum, pyrethrum products, fluosilicates, potassium hexafluoaluminate, sulphur, and sulphur and lime were tested as possible remedies.

TURNIP APHID

The turnip aphid was made a project during the latter part of 1931. This was made possible by an increase in appropriation that became available July 1, 1931. A study of the biology, habits, and control of the insect has been started. Norman Allen has been placed in charge of this problem.

Personnel:

Chas. E. Smith
P. K. Harrison
Norman Allen

BEE CULTURE

SOUTHERN STATES BEE CULTURE FIELD LABORATORY*

BIENNIAL REPORT OF PROJECTS

The Southern States Bee Culture Field Laboratory was established at Baton Rouge, Louisiana, in 1928, to study the beekeeping problems peculiar to the states of Texas, Louisiana, Arkansas, Mississippi, Alabama, Georgia, North Carolina, South Carolina, and Florida. The work of the laboratory was divided into two main projects; first, the problems relating to the shipment of bees and queens; and second, a study of honey plants, nectar sources, and the effect of various environmental factors on the collection of nectar by bees.

1. The shipment of Bees and Queens. The first need of the shipper of bees and queens seemed to be a more standardized shipping container and work was immediately started on that phase of the project. This has resulted in the publication of Circular No. E-287 "Recommendations for Shipping Cages for Bees." The work has now been ex-

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* The Southern States Bee Culture Field Laboratory of the Division of Bee Culture Investigations, Bureau of Entomology, United States Department of Agriculture, is maintained cooperatively by the Louisiana State University and the United States Department of Agriculture.

panded due to the demand from southern beekeepers to include studies on cage design and the food requirements of bees during shipment; the problem of the supercedure of bees during shipment, and various other seasonal studies which will finally give more information relative to the safe and economical methods of producing and shipping bees.

2. Honey Plants and Nectar Sources. This problem has received the attention of Doctor Everett Oertel, and is showing excellent progress. The diversity of honey plants throughout the Southern States has made it necessary to confine the work largely to Louisiana, although the collection of honey plants and the study of nectar sources is being studied in other localities, particularly the well known Tupelo section along the Apalachicola river in Florida. Colonies of bees on scales are located in areas where a single honey plant is abundant and daily weighings are made during the honey flow to determine the value of a nectar source under certain soil and environmental conditions.

It has been necessary to considerably enlarge the first project outline formulated for the laboratory. Work is now being carried on by Mr. Harry Laidlaw on the hand insemination of queen bees, and studies for the improvement of bees by means of hand mating are being started. In connection with the work toward the improvement of bees, several problems are being carried as time and season permit.

The following is a complete outline of the projects being carried by the laboratory at the present time.

1. HISTOLOGICAL AND PHYSIOLOGICAL STUDIES ON QUEENS AND PACKAGE BEES

a. *Effect of Shipping on Bees and Queens*—Included studies of such factors as size and design of cage, influence of age and condition of bees, methods of handling, influence of food and of temperature, humidity and exposure to environmental factors.

b. *Feeding and Death Rate Studies*—A critical study under controlled laboratory conditions of the effect of various foods on bees, the normal death rate of bees under various conditions of temperature and humidity, and the effect of cage type and design upon package bees kept under controlled conditions.

c. *Supercedure of Queens After Shipment*—A study of the reasons for, and methods of prevention of, the 10-15% loss from supercedure of all queens shipped in packages.

d. *Colony Management*—Studies and observations regarding those methods of management necessary under Southern conditions. Should include also practical methods of comb storage to prevent damage from wax worms.

e. *The Reproduction System of Queens and Drones*—A detailed histological and morphological study of the reproductive system of queens and drones, as these factors relate to the artificial insemination of queen bees.

f. *Queen Rearing and Artificial Insemination*—Studies relating to the improvement of methods of queen rearing, especially those factors of colony strength, amount of food, condition and ages of bees as they affect the size, prolificacy and stamina of queens and drones. A study of methods of artificial insemination of queen bees as a basis for breeding work for the improvement of races of bees.

g. *Egg Tubule Studies*—A critical study of the correlation between the number of egg tubules in the ovary of the queen and colony characteristics and productivity. Includes also a study of the influence of methods of rearing on ovarian development.

h. *Biometrical Studies of Breeding Queens*—Investigation of the variation in size of various parts of the bee during the season and the effect of controlled mating on the offspring.

2. HONEY AND POLLEN PLANTS IN THE SOUTHERN STATES.

a. *Collection, Identification and Preservation of Plants*—A study of honey and pollen plants collected from known localities and preserved for future comparisons.

b. *Studies on Nectar Secretion of Important Plants*—An investigation by means of colonies of bees on scales, of the importance of various nectar-secreting plants in various localities. Will include also critical studies on influences of various environmental factors on nectar secretion and nectar secretion of plants kept under controlled conditions. A histological study of the nectaries of various plants and of the effect of environment on nectarifous tissue.

c. *Plant Distribution and Environmental Studies*—A study of the distribution of various honey and pollen plants in the South, their value, and the amount of nectar secreted as related to conditions of soil and environment.

d. *Phenological Data*—A critical study of the blooming dates of various plants together with data on length of nectar secretion periods, value to bees, type of honey produced and other factors.

e. *Pollination Studies* (contemplated)—Will be started in 1932. A study of the value of bees as pollinating agents for white clover (trifolium repeus) especially in those districts where seed is produced as a cash crop.

Submitted by

WARREN WHITCOMB, JR.,
In charge Southern States Bee
Culture Field Laboratory.

CORN BREEDING

HUGO STONEBERG
Assistant Agronomist

The corn-breeding project at Baton Rouge, Louisiana, cooperative between the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture, was continued during 1930-31 along the same general lines as in previous years.

The ultimate object of the work is the production of higher yielding and better strains of corn than the present varieties and to determine certain fundamental facts about corn.

The work deals with the selection within selfed lines and subsequent utilization of the lines in F_1 and double crosses, and with the testing of these hybrids for yielding ability and other desirable qualities in comparison with the best local varieties.

Selfed lines and F_1 crosses between them from several varieties adapted to the South Atlantic States were introduced as a nucleus for the work at Baton Rouge, Louisiana, in 1923. New selfed lines of the best local varieties have been added from year to year. The latter lines are better adapted and offer greater promise than the older lines brought in from other states.

About 5000 self-pollinations and 700 cross-pollinations are made annually to continue the selfed lines and to obtain crosses for comparison.

In the selection of selfed lines, those showing deleterious characters such as, weakness of stalk or roots, envolved leaves, and excessive leaf spotting, are discarded, and only those showing desirable characters, such as prolificacy, sturdy symmetrical plants and dark green foliage are saved. Records on numerous other characters that may prove of importance as time goes on are also kept.

Crosses involving lines with long and tight husks have been produced that have excellent close fitting husks but only a few of these have proven superior in yielding ability to the best local varieties. Almost complete resistance to damage by insects to the ear has been secured by long close fitting husks.

Several F_1 crosses involving lines of local varieties have produced significant higher yields than the parent varieties.

Due to the difficulty in making a sufficient number of crosses between the better selfed lines to accurately determine the value of the lines in the crossed condition, the following method was begun in 1930. The selfed lines were planted in two isolated plots in alternate rows with Cocke Prolific in one plot and Yellow Creole in the other, and by detasseling the selfed lines, a large amount of crossed seed was obtained. It is hoped by this method that the value of the lines can be more easily and rapidly determined.

In 1931 many of these crosses produced yields higher than their parent varieties.

Studies of selfed lines with reference to their resistance or susceptibility to the mosaic disease were continued.

16092 R-J 4-32 5m

n Co. ıip)	Amtorg Trading Co. (Fellowship)	Amrican Cyanamid Co. (Fellowship)	Forest Prods. Co. (Special)	TOTAL	
....	$..........	$..........	$..........	$ 34,509.06	$..........
....	....	....	....	100,000.04	....
....	....	....	....	1,211.24	....
....	....	....	....	1,023.75	....
....	17.55	....	....	21,476.16	....
....	....	....	....	4,531.00	....
....	....	....	....	1,225.35	....
00.00	1,000.00	1,500.00	150.00	4,650.00	....
....	....	....	....	38,618.48	....
....	....	....	....	90,000.00	....
00.00	$ 1,017.55	$ 1,500.00	$ 150.00	....	$ 297,244.08

77.77	$ 366.67	$ 500.00	....	$ 128.193.95	....
33.11	5.15	....	....	45,818.61	....
....	....	....	....	1,499.87	....
....	....	....	....	2,409.60	....
....	....	....	....	4,353.12	....
55.50	4.90	2.50	4.65	6,141.79	....
68.93	....	....	....	3,027.10	....
5.00	....	....	....	897.36	....
77.27	....	103.45	....	10.350.43	....
33.03	....	....	....	1 ,851.83	....
....	....	....	....	3,125.45	....
....	....	....	....	2,562.56	....
....	....	....	....	2,464.41	....
....	....	....	....	190.29	....
....	7.55	....	....	7,353.33	....
....	273.17	....	....	6,342.97	....
27.70	2.75	....	....	13,666.29	....
....	18.22	....	71.51	27,304.82	....
....	....	....	....	995.04	....
78.41	$ 678.41	$ 605.95	$ 76.16	$ 268,548.82	....
1.69	339.14	894.05	73.84	28,695.26	....
00.00	$ 1,017.55	$ 1,500.00	$ 150.00	....	$ 297,244.08

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Studies of selfed lines with reference to their resistance or susceptibility to the mosaic disease were continued.

16092 R-J 4-32 5m

FINANCIAL REPORT, AGRICULTURAL EXPERIMENT STATIONS, LOUISIANA STATE UNIVERSITY

JULY 1, 1929, TO JULY 1, 1930.

RECEIPTS—	State Fund	Delta Sta. University Fund	Delta Sta. Parish Fund	Special Sugar Cane Fund	Fertilizer and Feed Fund	Hatch Fund	Adams Fund	Purnell Fund	Soil Survey Fund	Chilean Nitrate Co. (Fellowship)	Amtorg Trading Co. (Fellowship)	Amrican Cyanamid Co. (Fellowship)	Forest Prods. Co. (Special)	TOTAL	
Balance, June 30, 1929	$ 123.88	$ 209.98	$ 13,824.99	$ 11,310.85	$ 9,039.36	$	$	$	$	$	$	$	$	$ 34,509.06	$
State Appropriation	50,000.00	10,000.02		40,000.02										100,000.04	
Refunds	700.81		128.43	263.45	118.55									1,211.24	
Interest on Daily Balance	982.13		40.19						.43					1,023.75	
Sales	20,875.57	74.18		257.27	251.59						17.55			21,476.16	
Parish Appropriations			4,531.00											4,531.00	
Soil Survey Livingston Parish									1,225.35					1,225.35	
Special Investigations										2,000.00	1,000.00	1,500.00	150.00	4,650.00	
Commissioner of Agriculture					38,618.48									38,618.48	
U. S. Government Appropriations						15,000.00	15,000.00	60,000.00						90,000.00	
Total	$ 72,682.39	$ 10,284.18	$ 18,524.61	$ 51,831.59	$ 48,027.98	$ 15,000.00	$ 15,000.00	$ 60,000.00	$ 1,225.78	$ 2,000.00	$ 1,017.55	$ 1,500.00	$ 150.00		$ 297,244.08
DISBURSEMENTS—															
Salaries	$ 25,333.70	$ 4,260.00		24,783.20	14,790.07	6,734.98	10,138.40	40,509.16		$ 777.77	$ 366.67	$ 500.00		$ 128,193.95	
Labor	20,274.84	2,819.15	345.75	4,829.90	3,397.90	5,982.36	1,357.47	6,673.33		133.11	5.15			45,818.61	
Stationery and Office Supplies	608.78	25.35	4.00	331.52	304.00	55.40	13.95	156.87						1,499.87	
Scientific Supplies	37.75			378.39	1,255.48		242.06	495.92						2,409.60	
Feeding Stuffs	1,636.82	541.42		251.39	103.83	2.70	495.84	1,321.12						4,353.12	
Sundry Supplies	2,415.15	431.40	210.26	1,051.66	174.67	379.14	174.77	1,237.19		55.50	4.90	2.50	4.65	6,141.79	
Fertilizer	1,299.42	562.10		204.36	309.39	287.38	9.94	104.58		168.93				3,027.10	
Communication Service	571.73	55.27			165.22	72.17	5.00	22.97		5.00				897.36	
Traveling Expenses	3,267.38	494.71		3,081.03	642.91	15.95	33.47	1,687.35	646.91	377.27		103.45		10.350.43	
Transportation of Things	882.66	74.11	90.79	128.98	302.10	4.83	72.35	262.98		33.03				1 ,851.83	
Publications	8.00			588.71	1,251.32	1,267.22		10.20						3,125.45	
Heat, Light, Water & Power	1,237.87	413.03		154.96	422.68	25.14		308.88						2,562.56	
Furniture, Furnishings, Fixtures	749.09		87.07	25.45	1,096.75		46.40	459.65						2,464.41	
Library	8.35			16.05	86.06		36.80	42.85						190.29	
Scientific Equipment	237.75			1,747.77	1,179.00		1,926.92	2,254.34			7.55			7,353.33	
Livestock	1,406.80	.25	810.00		1,709.00		93.75	2,050.00			273.17			6,342.97	
Tools, Machinery and Appliances	6.456.06	133.13	2,283.88	1,652.69	227.38	152.90	352.88	1,958.33	418.59	27.70	2.75			13,666.29	
Building and Land	2,599.61	154.18	13,830.70	570.84	9,595.65	19.83		444.28			18.22		71.51	27,304.82	
Contingent Expenses	228.45	107.52	3.00		656.07									995.04	
Total	$ 69,260.39	$ 10,071.62	$ 17,665.45	$ 39,796.55	$ 37,750.48	$ 15,000.00	$ 15,000.00	$ 60,000.00	$ 1,065.50	$ 1,578.41	$ 678.41	$ 605.95	$ 76.16	$ 268,548.82	
Balance, 6/30/30	3,422.00	212.56	859.16	12,035.04	10,277.50				160.28	421.69	339.14	894.05	73.84	28,695.26	
Total Disb. and Balance	$ 72,682.39	$ 10,284.18	$ 18,524.61	$ 51,831.59	$ 48,027.98				$ 1,225.78	$ 2,000.00	$ 1,017.55	$ 1,500.00	$ 150.00		$ 297,244.08

o. ip)	Amtorg Trading Co. (Fellowship)	American Cyanamid Co. (Fellowship)	Forest Prods. Co. (Special)	Egg Laying Contest	Grasselli Chemical Co. (Flship.)	TOTAL
.69	$ 339.14	$ 894.05	$ 73.84	$..........	$..........	$ 28,695.26
...	....	....	....	....	....	100,000.00
...	....	....	....	....	....	1,461.57
...	....	....	....	580.97	....	22,732.19
.00	500.00	1,500.00	....	....	1,000.00	5,000.00
...	....	....	....	....	....	1,500.00
...	....	....	....	....	....	90,000.00
...	....	....	....	....	....	27,409.90
...	....	....	....	330.00	....	330.00
.69	$ 839.14	$ 2,394.05	$ 73.84	$ 910.97 487.45	$ 1,000.00	277,128.92
				1,398.42		

.96	350.00	1,200.00	....	....	....	139,404.70
.08	56.30	....	21.75	597.25	....	47,092.59
.70	....	....	....	6.50	....	1,452.96
...	12.13	....	35.45	....	....	2,643.94
...	....	....	....	688.54	....	7,132.44
.84	19.25	....	....	58.55	....	5,725.67
.28	....	....	....	8.75	....	3,004.17
.00	....	....	2.00	4.30	....	1,076.46
.69	....	498.64	13.17	....	....	11,046.53
.45	17.79	....	1.47	21.84	1.00	2,005.27
...	....	....	....	....	....	1,644.56
...	....	....	....	....	....	2,626.50
...	....	....	....	....	....	772.67
...	....	....	....	....	....	69.22
...	....	....	....	....	....	1,835.79
....	381.67	....	....	....	....	3,742.71
0.05	....	....	....	12.69	....	9,312.86
...	2.00	....	....	....	....	13,611.58
...	....	....	....	....	....	1,433.02
3.05	$ 839.14	$ 1,698.64	$ 73.84	$ 1,398.42	$ 1.00	$ 255,633.64
.64	....	695.41	....	....	999.00	21,495.28
1.69	$ 839.14	$ 2,394.05	$ 73.84	$ 1,398.42	$ 1,000.00	$ 277,128.92

FINANCIAL REPORT, AGRICULTURAL EXPERIMENT STATIONS, LOUISIANA STATE UNIVERSITY
JULY 1, 1930, TO JULY 1, 1931.

RECEIPTS—	State Fund	Delta Sta. University Fund	Delta Sta. Parish Fund	Special Sugar Cane Fund	Fertilizer and Feed Fund	Hatch Fund	Adams Fund	Purnell Fund	Soil Survey Fund	Chilean Nitrate-Co. (Fellowship)	Amtorg Trading Co. (Fellowship)	American Cyanamid Co. (Fellowship)	Forest Prods. Co. (Special)	Egg Laying Contest	Grasselli Chemical Co. (Flship.)	TOTAL
Balance, June 30, 1930	$ 3,422.00	$ 212.56	$ 859.16	$ 12,035.04	$ 10,277.50				$ 160.28	$ 421.69	$ 339.14	$ 894.05	$ 73.84	$	$	$ 28,695.26
State Appropriation	50,000.00	10,000.00		40,000.00												100,000.00
Refunds	1,173.59			200.58	87.40											1,461.57
Sales	21,989.17			162.05										580.97		22,732.19
Industrial Fellowship										2,000.00	500.00	1,500.00			1,000.00	5,000.00
Concordia Parish			1,500.00													1,500.00
U. S. Government Appropriations						15,000.00	15,000.00	60,000.00								90,000.00
Commissioner of Agriculture					27,409.90											27,409.90
Fees														330.00		330.00
Total	$ 76,584.76	$ 10,212.56	$ 2,359.16	$ 52,397.67	$ 37,774.80	$ 15,000.00	$ 15,000.00	$ 60,000.00	$ 160.28	$ 2,421.69	$ 839.14	$ 2,394.05	$ 73.84	$ 910.97	$ 1,000.00	277,128.92
Transfer	129.77	129.77			487.45									487.45		
	$ 76,454.99	$ 10,342.33			37,287.35									1,398.42		
DISBURSEMENTS—																
(1) Salaries	$ 25,434.39	$ 4,290.00		$ 24,318.58	21,036.09	7,321.67	11,713.24	42,740.77		999.96	350.00	1,200.00				139,404.70
(2) Labor	23,743.69	3,051.59		3,596.18	3,464.29	4,483.43	1,114.48	6,678.55		285.08	56.30		21.75	597.25		47,092.59
(3) Stationery and Office Supplies	672.54	12.50		118.12	259.14	57.15	20.46	303.85		2.70				6.50		1,452.96
(4) Scientific Supplies	34.02	6.90		318.61	1,429.29	37.42	599.06	171.06			12.13		35.45			2,643.94
(5) Feeding Stuffs	2,477.03	164.60		248.00	229.44	33.00	543.67	2,748.16						688.54		7,132.44
(6) Sundry Supplies	3,102.52	669.88		648.65	165.99	395.75	96.52	844.78		19.84	19.25			58.55		5,725.67
(7) Fertilizer	1,719.99	368.00		198.51	371.17		5.70	251.77		80.28				8.75		3,004.17
(8) Communication Service	567.21	111.46		183.44	97.23	66.16	2.00	37.66		5.00			2.00	4.30		1,076.46
(9) Travel Expense	3,768.52	119.38		3,181.76	380.55	30.88	178.61	2,143.52	158.81	572.69		498.64	13.17			11,046.53
(10) Transportation of Things	1,065.70	43.86	3.00	138.87	210.45		32.25	381.59		87.45	17.79		1.47	21.84	1.00	2,005.27
(11) Publications	40.26			372.77	29.47	1,202.06										1,644.56
(12) Heat, Light, Water and Power	1,245.72	464.15		35.71	451.25	214.43	3.00	212.24								2,626.50
(13) Furniture and Fixtures	280.41			161.43	282.50	28.80	4.25	15.28								772.67
(14) Library	26.42	9.35		14.75	5.20		13.50									69.22
(15) Scientific Equipment	112.27			30.12	217.94		539.35	936.11								1,835.79
(16) Livestock	2,015.41				200.00		36.18	1,109.45			381.67					3,742.71
(17) Tools, Machinery and Appliances	3,597.93	531.46	275.58	694.47	2,368.78	382.84	97.73	1,339.86	1.47	10.05				12.69		9,312.86
(18) Buildings and Land	5,585.01	320.00	2,025.92	853.10	3,697.73	746.41		85.35			2.00					13,611.58
(19) Contingent Expenses	379.70	179.20		12.70	861.42											1,433.02
Total	$ 75,868.74	$ 10,342.33	$ 2,304.50	$ 35,125.77	$ 35,757.93	$ 15,000.00	$ 15,000.00	$ 60,000.00	$ 160.28	$ 2,063.05	$ 839.14	$ 1,698.64	$ 73.84	$ 1,398.42	$ 1.00	$ 255,633.64
Balance, June 30, 1931	586.25		54.66	17,271.90	1,529.42					358.64		695.41			999.00	21,495.28
	$ 76,454.99	$ 10,342.33	$ 2,359.11	$ 52,397.67	$ 37,287.35	$ 15,000.00	$ 15,000.00	$ 60,000.00	$ 160.28	$ 2,421.69	$ 839.14	$ 2,394.05	$ 73.84	$ 1,398.42	$ 1,000.00	$ 277,128.92

REPORT OF THE AGRICULTURAL EXPERIMENT STATION FOR THE YEARS 1931-1933

By

C. T. DOWELL

Director

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATIONS

INTRODUCTION

The annual reports of this Station and those of most other state stations have consisted in the past of a statement in regard to the finances and a fairly detailed report on each problem that the station was investigating. In looking over this report, you will see that it differs quite materially from the ordinary Experiment Station report. In the first place the members of the Station Staff have not attempted to give a report on each project that is under way. In the second place they have not confined their reports to a period of two years. They have gone back over their work for a period of six or seven years and have pointed out the results that have been accomplished that appear to be of the greatest importance. I think that this is a thing that should be done at irregular intervals in order to sum up or to take stock of the accomplishments of the Experiment Station. If we confine our inventory taking to periods of one or two years, it is quite likely that we will not realize that the Station is making much progress; but when we look at it over a longer period of time it is easier to see the progress that is being made.

To those who are familiar with the work of the Agricultural Experiment Stations, it would seem to be unnecessary to attempt to tell what the functions of a station are. However there are many people, particularly those not connected with agriculture, who are not familiar with the work of Experiment Stations; they are not familiar with the various agencies that are trying to help agriculture. A word might be said here for their benefit.

I think the Director of an Experiment Station should look up on the state in which he is located in the way in which a farmer looks at his farm. He should take into account the nature of his soil, the climate, the labor that is available, the transportation and market for his products. A farmer's organization should be so planned as to enable the farmer to obtain the most possible out of the resources of his farm and his labor. The Director of the Experiment Station and the Station Staff stand in a position so far as the state as a whole is concerned similar to that of the farmer in making his farm plans. They need to take into account the same things that a farmer takes into account and to direct the agriculture of the state so as to get the most out of the agricultural resources and the farm labor. This means that the state as a whole should have an agricultural program just as the farmer has a program for his farm, and it is my understanding that it is the function of an Experiment Station to help to work out such a program and to make it possible to carry it out most efficiently.

If such a program is to be formulated and carried through efficiently, the Experiment Station needs to concern itself not only with the farm enterprises that are under way at the time but it needs to concern itself also with farm enterprises that are not carried on to any great extent, but that if carried on more extensively would lead to a more efficient use of land and labor. This is something of the nature of the task that the Louisiana Experiment Station is undertaking and has had in mind for some time. After such a program is worked out for the state as a whole, and for each district, the departments of the Station should get information which will make it possible for each agricultural enterprise to be carried on efficiently. It is only by a proper combination of farm enterprises and the carrying on of each one of these enterprises in an efficient manner that the farmer may expect to get the most out of agriculture as a business. What I am attempting to show is what the function of an Experiment Station is. I do not believe that is is entirely to enable the farmer to produce a better quality of cotton or other agricultural product. It is this and more. It is to have the agricultural organization such that we can expect to get the maximum returns from it.

The agricultural income of the State of Louisiana is small compared with that of many other states. I do not believe that this need be true. We have, I think, a higher percentage of good land in this state than there is in most other states of the Union. We have a long growing period and we have ample rainfall. If our agricultural resources were used efficiently, the agricultural income of this state could be increased probably two-fold or more. I have discussed some phases of this situation in Louisiana Station Circular Number 6. It has been estimated that we have in the state a million or a million and a half acres of good alluvial land that are now lying practically idle. I have stated some of the things that the Experiment Station has done looking towards possible ways of using these rich lands. I have called attention also to the fact that we have millions of acres of cut-over pine land and hill land some of which is now in cultivation is not suited for agriculture and some of it that is not in cultivation is suited for agricultural purposes. We need a complete survey of these cut-over and hill lands for the purpose of finding out which are adapted to agriculture and which are suited to forestry only. We must concentrate our farming in the hill territory on lands that are suited for agriculture, and we must plant trees to the land that is suitable for forestry. We have done nothing thus far in the way of a survey of our cut-over pine lands and hill lands. Such a survey should be under taken either by the Experiment Station or by some other agency.

You may not have noticed that in several places in this introduction I have stated that the farm organization should be such that the farmer will get the maximum returns from his agricultural resources and his labor. It is a well known fact that a one crop system makes it impossible for a farmer to use his labor efficiently.

This is a subject that has been discussed time and time again, but I think it is one that needs to be held constantly in mind by those who are trying to promote the agricultural welfare of this state. The conditions are much more favorable for the production of livestock than they are in many other states. We have a long growing period. It is possible to have pastures for every type of livestock throughout the year. We have or can produce a supply of feed sufficient to supplement these pastures. I think if we would carry on the agriculture of the state in anything like an efficient manner we should take advantage of these favorable conditions. If we do this by combining field crops with livestock production, the farmer will be able to use his time and his land to better advantage than it will be possible for him to do by confining his attention to one crop. While such a combination of farm enterprises can be advocated as a general principle, I am emphasizing it here because of our favorable conditions for the production of livestock and also because of good markets. The Louisiana Station has this thought in mind as a part of its program and is accumulating information which will enable the farmer to carry on these livestock enterprises. Our studies in the rice territory have shown that the farmers who combine the growing of beef cattle with rice production have made the most money during the last few years. With the eradication of the cattle tick, with the improvement of pastures and the better wintering of cattle in the rice territory, the income from this enterprise could be increased immensely. Likewise our studies in the hill sections have shown that the farmers who have had a combination of livestock and crop production have fared better during the last three years than have those who confined their attention to field crops. The point that I want to emphasize is that we have favorable conditions for the production of livestock, we have a good home market and we should take advantage of these conditions.

The report which follows, as already stated, points out some of the outstanding accomplishments of the Louisiana Station during the last six or seven years. The Station Staff is trying to carry out a program which will get information that will be helpful in the development and efficient use of the agricultural resources of the state. I think we have made considerable progress. There is much yet to be done and if we are to reach our goal it will require the concerted thought and effort of everyone whatever his vocation may be.

NOTE—Reports from the four substations will be issued next year.

ANIMAL INDUSTRY

FEEDING VALUE OF RICE BRAN

Louisiana produces annually about 17,000 tons of rice bran which frequently sells much below its real value. While it is true that large amounts of rice bran fed to hogs produce oily pork, rice bran may be fed satisfactorily in amounts up to 40 per cent of the ration. Two series of experiments have shown the value of rice bran for fattening hogs if fed in proper combination with corn. In 1932, rice bran when fed in amounts not greater than 35% of the ration, showed a value of $14.80 per ton as compared to corn at $15.00, or 98.6% the value of corn. The rice bran had been bought at $8.00 per ton. In 1933, rice bran was compared with wheat shorts as a supplement to corn, along with protein supplements. With wheat shorts valued at $18.00 per ton, rice bran showed an average value of $17.30 per ton, or 96% the value of wheat shorts. These experiments show rice bran to be a very economical feed for swine when fed in the right combination with corn.

MOLASSES FOR MULES

Blackstrap molasses, the chief by-product of sugar manufacture in Louisiana, is another feed that often sells below its real value. Experiments in feeding blackstrap molasses to farm work mules in 1929, 1930 and 1931, at this Experiment Station, showed that blackstrap molasses is equal to corn as a feed for work mules where from 6 to 9 pounds of molasses is fed per day. Mules receiving 9 pounds of molasses sweated more and seemed to "wind" more easily than the mules fed 6 pounds per day. When more than 6 pounds per day is fed, it is recommended that fresh molasses be fed daily in preference to mixing the molasses with the feed in quantities before hand, as the molasses mixture may ferment and cause digestive troubles.

SHRIMP MEAL

Shrimp meal, which is a by-product of the shrimp canning industry, in Louisiana, has been proven in our experiments to be superior to tankage as a supplement to corn in feeding hogs. Tankage usually sells at approximately twice the cost of shrimp meal. In three experiments with shrimp meal and tankage, fed both with and without other protein supplements, the hogs fed shrimp meal made higher gains than the hogs fed tankage and the cost per hundred pounds gain has been 8 to 9% less. A combination of equal parts of shrimp meal and cottonseed meal, two Louisiana feeds, produced greater gains per day at lower cost than where shrimp meal was used as the only supplement. The shrimp meal and cottonseed meal mixture has been superior to tankage and cottonseed meal. The standard protein supplement now recommend by the Louisiana State Experiment Station is made up of 50% shrimp meal, 30% cottonseed meal, and 20% ground alfalfa hay or clover hay. This supplement is much more economical and efficient than tankage.

MOLASSES FOR STEERS

Two years of experimental work have been conducted with molasses for fattening steers, and shows that molasses is practically equal to corn for feeding steers, particularly when fed in amounts not much over 2 pounds per day.

SURVEY OF WOOL PRODUCTION

A partial survey of wool production in Louisiana was attempted in 1931 and 737 fleeces from different parts of the state were weighed and sampled. One of the principal results of this survey is the demonstration of the value of better breeding. Common piney-woods ewes produced about 2.4 pounds of wool averaging 2.76 inches in length, and native ewes showing some Cheviot breeding averaged 3.46 pounds of wool per ewe. Ewes out of native dams and sired by pure-bred Delaine-Merino rams produced 6.74 pounds of wool.

IMPROVEMENT OF PASTURES FOR BEEF PRODUCTION

In 1931, an experiment was started to determine the possibilities in discing, seeding and mowing black land not suitable for cultivation, as pasture for beef cattle. In 1931, this land produced an average of only 69.4 pounds of beef per acre. The field has been mowed regularly to kill weeds since the spring of that year and drains have been opened up. That fall the field was divided into equal parts and one-half was disced and seeded with 6 pounds White Dutch clover, 9 pounds Red Top and 9 pounds Italian rye grass per acre. In 1933, the half that had been disced and seeded produced 264.8 pounds of beef per acre as compared to 148.6 pounds per acre for the half that had been mowed only. In 1931 another field on somewhat better land produced a total of 372 pounds beef per acre, showing the high value of Louisiana river land for beef production.

PASTURES FOR SWINE

Louisiana white clover pasture has been shown to be of high value in production of pork. Fattening pigs running on white clover pasture gained 11 per cent faster than those fed on dry lot and the pasture saved $7.90 worth of feed during the 100 days of the test. As 20 pigs could have been carried on the acre of clover, the acre would have been worth almost $15.98 in feed replaced. For brood sows with small pigs pasture is especially valuable. The pigs on pasture gained 21% faster on pasture than in dry lot. In 36 days an acre of white clover pasture saved $9.11 in feed for sows and pigs and an acre of winter oats and rape saved $6.37 in feed.

AGRICULTURAL ECONOMICS

The Agricultural Credit Situation in Louisiana (Louisiana Bulletin No. 208). This study made a thorough analysis of the agricultural credit situation and discovered many of the weaknesses of the present credit system (1928). The analysis included conditions of credit as to term, costs, uses and security required. Specific recommendations were made with respect to strengthening the credit structure. A wider adaptation of these recommendations would certainly have eased the financial crash that has struck so seriously at Louisiana in the past few years. (Thompson)

Financing Production and Marketing of Louisiana Strawberries and Suggested Reorganization (Louisiana Bulletin No. 219). A study of strawbarry marketing through the local associations in 1930. Emphasis was placed on the production credit costs, and costs of marketing strawberries through existing agencies. A comprehensive program was worked out whereby strawberry growers might strengthen their financial position by consolidating their marketing associations into a more efficiently operated agency and thereby obtain production and marketing credit at a lower cost to the growers, as well as to operate on a narrower margin through improved business efficiency. (Thompson)

Louisiana Farm Taxes, (Three Parts, Louisiana Bulletin No. 231). A complete analysis of the tax situation in Louisiana together with a suggested revision of the Louisiana tax system in the light of findings concerning the prevailing burden of taxation. Based upon findings of a study of a large number of individual taxpayers. (Thompson)

Cotton Price-Quality Relationships in Local Markets of Louisiana, (Louisiana Bulletin No. 221). A comprehensive study in determining the extent to which prices paid to farmers in local markets varied with staple and grade. Very valuable information was obtained showing the disadvantage placed upon farmers producing cotton superior in grade and staple under local market methods of buying. (Farrington)

Farm Trade Centers in Louisiana, 1901 to 1931, (Louisiana Bulletin No. 234). Since work in rural sociology commenced in 1931, a project has been completed dealing with the trade centers of the State. An analysis of changes since 1901 pointed out which types of business were gaining and which losing in importance, and showed which types could best be offered in a town of a given size. A second project is now under-way collecting the most pertinent information concerning the make-up, vital processes, (i. e. birth and death rates), and migration of the population of the State. Both of these projects and especially the latter, furnish information absolutely necessary in any planned agriculture. (Smith)

An Economic Study of Factors Affecting Farm Organization and Power Utilization on Sugar Cane Farms, 1929 (Louisiana Bulletin No. 215). A study of comparative costs of using tractor and mule power on cane farms, and the factors affecting the unit cost of each type of power. Most efficiently used tractors were operated at a cost of $8.08 per day compared with $18.16 for the least efficient use. Unit costs of mule labor decreased from about $1.80 per day when only 70 days were worked to about $0.80 when 200 days were worked annually. Costs of loading cane with a power loader were found to be about one-third lower than loading by hand. (Reuss)

Hauling Cane by Wagon (Louisiana Circular No. 4). A very detailed study showing the financial saving to plantation owners actually obtained by the arrangement of their field layout to facilitate hauling to the hoist or mills. Important economies depend upon length of haul, size of load, and elimination of wagon and loader delay. (Reuss)

The Organization and Financial Returns of 129 Small Sized Louisiana Cane Farms, 1930 (Louisiana Bulletin No. 224). A financial test of the profitable degree of diversifying cane farms with other cash crops. Labor incomes and cash incomes increased as the proportion of cane was increased up to about 50 per cent of the crop area. Cotton and truck crops tended to reduce income when used to replace cane. These results have been too well substantiated since these recommendations were reached. (Reuss)

Rice Farm Irrigation Systems in Louisiana (Louisiana Bulletin No. 216). Irrigation costs under various systems are considered and compared. Economy of individual systems depends upon acreage flooded and size of plant. Diesel engine plants flooding less than 300 acres per plant had an average cost (1930) of $7.54 per acre compared with $5.46 for plants flooding over 300 acres. Electric motors are cheaper than Diesel engines for power when the acreage operated is comparatively small. (Saville)

Tractors and Trucks on Louisiana Rice Farms (Louisiana Bulletin No. 218). A detailed study of costs and accomplishments of different power units on rice farms. Costs of operating different makes and sizes of tractors and comparative accomplishments on different sized farms are presented. Decided economies in tractor costs are obtained largely through increased use, being about $13.00 per day for an annual use of 40 days and $7.90 for 80 days for large tractors. Important relationships between volume of hauling and truck costs are presented. Also the importance of size of farm and machinery use in labor economy are shown. (Saville)

Factors in the Organization and Successful Operation of Louisiana Rice Farms, (Louisiana Bulletins No. 217, 233). This is a comprehensive study that shows the important relationships existing between acreage of rice, yield of rice, livestock returns, cost of producing rice and farm and labor earnings. Emphasis is given to the importance of rice prices and costs in successful operation. Rice farmers were warned of an impending difficulty in the preliminary report (November 1930). The necessary steps to profitable operation are explained in the relationships between size and efficiency and the expected price for rice. Success depends upon low cost rice production rather than diversification. The most successful farmers are those obtaining high labor and machinery efficiency on a medium to large sized farm. (Saville)

Two other manuscripts are completed on use of farm machinery on hill cotton farms and the systems of farming that have proven more profitable under low price conditions. A study of farm machinery has indicated that most farmers failed to take advantage of profits from the purchase of machinery because the acreage handled has not been increased to permit adequate utilization of equipment to the extent that low cost of production could be obtained.

In the study of most profitable systems of farming the combination of cotton with livesock has proven more profitable in the period of low prices. This is due largely to the efficiency of labor in handling the same acreage of crops that farmers without as much livestock handled. Addition of farm income from dairy and other livestock products has been of extreme importance to farmers in the hill cotton area.

ANIMAL PATHOLOGY

THE VALUE OF CONTROLLING PARASITES IN HORSES AND MULES IN LOUISIANA

To determine the relationship existing between colic and infestation of intestinal parasites in horses and mules, a series of tests were conducted covering a period of four years.

The results show that colic in mules and horses could be practically eliminated if the animals were treated for intestinal parasites semi-annually. It was also shown that when the animals were free of parasites they showed a gain in weight and improvement in physical condition, thus increasing greatly their capacity for work.

This information is being used by the veterinarians and extension agents, as well as the farmers themselves with results comparable **to** those obtained in the experiments.

CONTROL OF ANTHRAX BY ANNUAL VACCINATION

It has been demonstrated for over a period of twenty years that Anthrax can be absolutely controlled by the practice of annual vaccination. All live stock including horses, mules and cattle owned by the University have been vaccinated annually for a period of over twenty years. During this period not a single death has occurred from this disease among the University live stock. Cases have occurred in unvaccinated stock on adjoining farms. During the past year one farmer lost 250 head of cattle from this disease.

Our results indicate that losses from Anthrax can be absolutely prevented on Louisiana farms by the practice of Anthrax vaccination.

AGRICULTURAL ENGINEERING

In 1931, Louisiana harvested a total of 326,000 tons of hay with avalue of $3,667,500. With natural sun-curing, from 40 to 60 per cent of the hay produced in this state is damaged by dew or rain. With natural sun-curing, additional feeding value is lost by the shattering of small stems and leaves, which are the most valuable parts of a plant.

The artificial hay drier developed by Louisiana Experiment Station produces a first quality hay, with feeding trials showing 1 ton of artificially cured soybean hay to be equivalent to 1½ tons of sun-cured hay. The annual hay crop of Louisiana can be increased by artificial curing by approximately 30 per cent.

The alluvial soils of Louisiana are some of the richest in the state; but are cut up into small plots, because of the many open drains necessary in order to secure adequate drainage. These open ditches and small plots hinder the use of large field machines. However, a five-year study of corn and soy bean production has proven mechanical power units and larger machine units to be satisfactory.

The largest single saving was obtained by substituting a heavy disk in place of a plow during seedbed preparation. Over a 3-year period the disked land gave yields equal to that of the plowed land.

Summary of Power and Labor per Acre

Two-mule implements	$8.27
Two-mule plowing—4-mule cultivation	7.10
General Purpose Tractor plowing—4-mule cultivation	6.36
General Purpose Tractor plowing—Tractor cultivation	5.92
General Purpose Tractor disking—Tractor cultivation	4.18

In order to secure machinery better adapted to sugar cane culture, considerable work has been carried on cooperatively with

Case, John Deere, and International Harvester Machinery Companies. Directly or indirectly, through our efforts, three tractors and attached implements well suited to sugar cane have been developed.

The hauling of the cane crop during wet years presents a difficult problem. Wagons with various size steel wheels **and** various size rubber tires are each being tested. Large diameter low pressure rubber tires reduce the drafts approximately 50 per cent of that of the steel wheels.

Preliminary surveys and test stations have been established to determine more accurately the problem of drainage ditch maintenance. Drainage ditch maintenance requires from 7 to 12% of the operating cost on a plantation as now practiced.

ENTOMOLOGY

During the past seven years the resources and efforts of the Department of Entomology have been concentrated primarily upon the problem of assisting sugar cane growers to control the sugar cane borer and other insect pests which have been an important part of the problem of maintaining the sugar industry in Louisiana.

In the seasons of 1926 and 1927, it was clearly demonstrated that a very important degree of control of sugar cane borer multiplication may be secured by destroying the first generation of borers which frequently occur concentrated in fields of early maturing corn. Such heavily infested early corn may be easily identified by the planters and these areas may be made a trap for borers by cutting and feeding out the corn as soon as tassels begin to appear. This practice allows a period of about ten days for removal of the corn and yet prevents to a very large degree the emergence of moths therefrom which might multiply later in the season on later corn or spread to fields of cane nearby. In a number of cases which were carefully studied, planters have credited the disposal of trap corn with having protected their cane crop to a very large degree against borer damage.

No method of insecticidal control for the sugar cane borer had been found effective or practicable until the beginning of our applications of sodium fluosilicate, which were made in the fall of 1925 and continued through the season of 1926 especially. These applications showed that sodium fluosilicate of the lightest, best dusting type available, applied to the cane fields in the form of a dust, resulted in the destruction of from 40 to 63% of the borer stages in the cane within two weeks after the dust was applied. It was found that the most strategic time for the application of sodium fluosilicate is usually during July, soon after the eggs for the second generation have hatched and before the borers have become large enough to do serious damage to the cane. At this season of the year control by egg parasites is usually very slight, naturally. Therefore an application of the sodium fluosilicate at this time supplements the work of the parasites and renders their later control of the borer still more effective. It requires from 5 to 10 pounds of sodium fluosilicate per acre applied in July to accomplish this result, and planters have frequently found this to be an advisable practice.

The principal effort of the department during the past seven years has been to discover whether it may be possible to increase the efficiency of the egg parasite, **Trichogramma minutum**, Riley, which is the principal natural enemy of the cane borer in Louisiana. Previous to our investigations these egg parasites had not been found to occur in cane borer eggs before the latter part of June, and we found that in many cases they did not occur in fairly heavily borer infested fields of cane before some time in August. The idea occurred therefore to the entomologists that if it were possible to multiply this parasite upon some one of its many alternate host eggs, and colonize in the fields upon cane borer eggs so as to start their beneficial work earlier in the season and at a higher rate of parasitism, their usefulness might be greatly increased.

In this effort the entomologists at the Louisiana Experiment Station developed methods for producing the borer egg parasites upon the eggs of the Angoumois grain moth, which could be bred from corn or other grain throughout the winter and thus provide an abundant and favorable host egg supply for the parasite at a season when no cane borer eggs occur. It has now been fully tested and become commercial practice to produce these egg parasites in this way and they are being utilized in many problems of insect control in various parts of the United States and for control of the sugarcane borer in Barbados, Mexico and Peru especially.

Field colonization work conducted through seven seasons has shown a very consistent and decidedly important benefit in the control of the sugar cane borer and the increase in the sugar produced per acre in properly colonized areas. Naturally it requires some time to develop reliable methods for testing and measuring the extent of these benefits. During the past seven seasons, without exception, the average results of this work have proven to be decidedly helpful. The extent of the benefit was first measured in terms of increased sugar produced per acre in the season of 1932, and later in 1933. The experimental methods used and the results secured are stated in fuller detail in Louisiana Experiment Station Bulletins No. 235 and 248.

To summarize these results very briefly, we may say that in the work of 1932 the average results in a large number of fields considered as "protected" by colonization work, showed an increase of 968 pounds of sugar per acre more than the average yield secured in a large series of comparable check fields where only natural parasitism occurred. This increase in sugar at prevailing price for sugar gave a gross value of $29.04 per acre, with a cost for colonization work totalling less than $1.00 per acre, therefore a net profit of $28.00 per acre may be considered the average value of the colonization work conducted in 1932. County agents secured equally good results during that season.

In 1933, under less favorable conditions for parasite colonization and with generally lighter borer damage, the average of colonized areas yielded 355 pounds of sugar per acre more than the average of their comparable check areas. At the prevailing price for sugar in 1933, this gave a gross increase in value of $12.44 per acre. Again, colonizations made in June at the rate of 5000 to 6000 parasites released per acre, cost approximately $1.00 per acre; while colonizations made at the first of August, at the rate of 10,000 parasites per acre, cost nearly $2.00 per acre. The net profit on the entire work in 1933 averaged more than $11.00 per acre as a result of colonization and according to plantation records as to yields and analysis.

In each season there was shown to be an average yield increase of approximately 20 pounds of sugar per ton in colonized areas more than in their comparable check areas, and taking an average of all varieties tested. There was also a very definite increase in the amount of sugarcane harvested and milled, ranging from one to three tons or more with some varieties where colonization was practiced. The moth population produced through the summer season in millable cane has been reduced approximately one-half in an average of all the tests thus far made.

Experimental work conducted to measure the effects of borer infestation upon the value of seed cane and the yields in crops following has demonstrated the importance of using as seed plats of cane of any variety which are as free from borer infestation as it may be possible to secure.

The results of this work have been published in Louisiana Experiment Station Bulletin No. 240. It appears that as borer infestation in seed cane of any variety increases there is a somewhat correspondingly close relationship to increase in the skips or unoccupied stretches of row in the field. There is a corresponding decrease in the germination of the cane and a retardation effect with the heavier infestation of the seed. The reduction in yield of the plant cane crop in some cases ranged as high as a loss of 7 tons per acre in the more heavily infested seed and with the more susceptible varieties of cane. The more vigorous growing varieties may compensate in a large degree for borer infestation in the seed, but the value of borer-free seed cane is still decidedly important.

CROPS AND SOILS

USE OF LIME ON STRAWBERRIES

The solving of various fertility problems of the State of Louisiana has in a large part been accomplished by the untiring efforts of the men engaged in the study of soils. The need of rather definite amounts of lime on the more acid soils of the famous Hammond strawberry section for the growing of strawberries has been definitely established. With lime the plants come through the summer in a very vigorous condition, whereas without lime the plants deteriorate and die. The finding out of this fact alone will save the strawberry growers thousands of dollars. Experimental results indicating the amount of lime needed for soybeans, sweet clover, Austrian winter pea, etc. on the various soils of the state will result in the most economical use of lime.

CALCIUM ARSENATE HARMFUL TO RICE

The establishment of the fact with pot experiments of the extreme sensitivity of rice to small amounts of calcium arsenate—incorporated in the soil through cotton dusting—will warn the farmer of the inadvisability of following cotton with rice, and thus save him partial crop failures.

SOIL AND FERTILIZER STUDIES

The practical knowledge that the farmer has obtained in regard to the proper ratio, amount, placement and source of fertilizer ingredient through the study of the soils research laboratory has saved the farmers of Louisiana alone tens of thousands of dollars.

The setting forth through field tests of the special need of potash and phosphorus on certain soils will save the farmers hundreds of thousands of dollars on these soils. Where these extreme deficiencies exist, crops like cotton are often nearly a complete failure. The field tests demonstrating the practical value of winter legumes in growing nitrogen will save the farmer a large part of his fertilizer bill as well as bring his land to a higher state of productivity.

Land classification studies, which have been carried on will, with further expansion give untold information in the adjustment of land utilization.

FORAGE AND SMALL GRAIN CROPS

The most outstanding progress made with forage crops during the past 5 years has been in conducting definitely planned experiments and plant breeding projects which have given some light to the Louisiana farmers' problems as regards the variety, date, rate, method of planting, and the culture and harvesting of the crops that are to furnish feed for livestock and leguminous fertilizer for the live-at-home farm program. New varieties and crops have been introduced and developed. Some have been improved by selection and crossing. Under the present farm conditions a farmer must grow ample feed and seed, and as much of his nitrogen as is possible in the form of leguminous crops, for his needs.

Preliminary results indicate that:

Soybeans adapt themselves to a wide range of possibilities when the proper varieties, methods, and culture are considered for the particular uses for which they are grown.

Some varieties of clovers, and vetches, and Austrian and tangier peas produce substantial yields for soil improvement or for pasture and hay. Alfalfa is dependent upon the application of some form of lime when grown on the bench-land soil. Lespedeza sericea requires cultivation to produce satisfactory growth and seed the first year.

Grain and sweet sorghums provide good insurance for a feed crop when corn fails and may also be used for silage. They may be planted from April until August.

The so-called rustproof types of oats are not sufficiently resistant to crown rust to produce satisfactory yields under severe rust conditions obtained during some years in South Louisiana. In cooperation with the U. S. D. A., new crown-rust-resistant varieties crossed with our high yielding "rustproof" oats have been introduced and are showing promise.

VALUE OF WORK AT THE OUTFIELD STATIONS

The work at the Outfield Experiment Stations has been helpful in:

First—Bringing home to the farmer the importance of choosing crop varieties best adapted to his own soil and climatic conditions, by showing that very often some popular variety will produce only half as much as an improved adapted variety.

Second—Introducing and testing new varieties developed by this and other experiment stations under a wider range of conditions than could be attained by the main and branch stations alone.

Third—Showing the most profitable ratios and amounts of fertilizer applicable to each soil type, thus giving the farmer the most for his fertilizer dollars and showing others where it may be profitable to use fertilizers.

COTTON BREEDING

It appears that the Experiment Station is making some progress in cotton breeding. Not only is the staple of our varieties and strains becoming longer and more uniform in length, but the production, in comparison with other varieties, is increasing. In 1932 eleven tests were conducted in various parts of the state. The average production of Station strains and varieties in these tests was 357.9 pounds of lint per acre. The average production of varieties from other sources was 335.0 pounds per acre. The average production of the best Station strain, which outyielded all the varieties tested, was 403.2 pounds. The leader and two others of the five ranking varieties in the tests were Station selections.

Figuring on basis of the yields made in these carefully conducted tests the past season, if the cotton acreage of Louisiana had all been planted in our best variety, the state yield would have been increased 231,472 bales. This would represent a value of $11,573,600 if cotton is valued at ten cents a pound.

GOOD COTTON CAN BE GROWN IN SOUTH LOUISIANA

The Experiment Station has shown rather conclusively that a good crop of cotton can be produced in South Louisiana even under the adverse cotton growing conditions prevailing there. The following figures on lint yields per acre at Baton Rouge since 1927 show this:

	Bluff Land		Bottom Land	
1927	Dixie Triumph	411	Delfos	304
1928	Dixie Triumph	554	Delfos	352
1929	Dixie Triumph	523	Delfos	490
1930	Dixie Triumph	644	Delfos	637
1931	Dixie Triumph	711	Delfos	782
1932	Dixie Triumph	455	Delfos	393
1933	Dixie Triumph	657	Delfos	836
Seven Year Average		565		542

The state yield for the ten-year period, 1922-1931, was 191#; the yield in 1932 was 173#, and the indicated yield in 1933 is 183#. Yields made by farmers in the vicinity of Baton Rouge are low, probably not more than 100# of lint per acre on the average.

The experiment Station has found that good yields may be produced regularly by using good cultural methods, fertilizing judiciously, and by using poison freely to control boll weevils.

RICE SOILS

The effects of the decomposition of organic matter and flooding on the oxidation-reduction equilibrium, on the solubility and availability of the nutrient elements and on the changes in the profiles of the Crowley series and other soils of the rice area have been studied.

It has been found that within a few days after submergence the soils become highly reducing, Eh 0.04 to 0.20 volt, and the solubility of the iron and manganese in the soil solution is markedly increased while the solubilty of phosphorous both native and applied is decreased to extremely low values. The addition of organic matter, soybeans, to the soil before planting rice increased the concentration of the reduced products in the soil solution soon after flooding but also increased the concentration of phosphorus in the soil solution. There is no marked increase or accumulation of soluble aluminum in the flooded soil but soluble silica is present in the soil solution in concentration as high as 30 p. p. m. Under highly reducing conditions in compacted soils there is formed an incrustation or sheath of precipitated iron compounds around the older rice roots which either renders them ineffective or causes them to decay. The precipitation of the reduced products around the roots is apparently caused by the diffusion of oxygen from the root or the presence of a slightly higher oxygen tension at the root surface than in the abnormally reduced soil solution.

Results from the growth of rice in pots on virgin Crowley silt loam and on the same type of soil that had been planted to rice for a number of years shows that the addition of organic matter, soybeans, to the soil increases the response to phosphorus and potassium. On the new soil the increases in the yield of grain from the additions of organic matter alone and combined with phosphorus, potassium, lime and sulfur varied from 33 to 88 per cent. The addition of organic matter alone increased the yield of rice, grain, 57 per cent. Organic matter in combination with phosphorus increased the yield 66 per cent, while organic matter in combination with phosphorus and potassium increased the yield 81 per cent. Small applications of lime increased the effectiveness of phosphorus somewhat but did not increase the effectiveness of potassium. Equivalent applications of sulfur depressed the effectiveness of the additions of phosphorus. The increases in yield on the old cultivated soil from the addition of organic matter alone and in combination with phosphorus and potassium varied from 32 to 136 per cent. The old soil did not respond significantly to a complete commercial mixture or to the fertilizer elements singly or in combination without organic matter. These results indicate that the increased yields from the addition of organic matter, soybeans, are due more to the production of carbon dioxide and the development of a better physical structure that permits of better aeration in the soil than to the direct nutritive effects of the elements carried in the soybeans. The presence and decomposition of organic matter in soil is a major factor in maintaining the availability of phosphorus and potassium in irrigated soils.

Studies on the changes in profile of the coastal prairie soil show that irrigation increases compaction of the B horizon. The use of salt water causes the compaction to develop more quickly which may reduce the percolation of water and the diffusion of gases to a critically low point so that rice growing on compacted soils low in organic matter is injured from reduction and the lowered availability of the nutrient elements associated with the low oxygen supply. In some cases an increase in alkalinity accompanies the extremely poor drainage. There are present in the soils of the rice area localized spots of degraded siliceous materials which show that the soils are degrading or changing from solonetz like to soloti profiles. In general these changes have not progressed far enough to affect the fertility to a great extent.

Experiments with the use of organic matter, gypsum, lime, and sulfur for the purpose of correcting the physical state and increasing the aeration in Crowley soils are in progress.

A copy of a paper on the profile studies which will soon appear in "Soil Science" is attached to this report.

DAIRYING

To obtain a better utilization of cotton by-products, three series of experiments have been conducted. In one test it was found that 206 pounds of whole cottonseed were required to replace 100 pounds cottonseed meal in a good dairy ration, that cottonseed fed only with legume hay in dry lot, or on pasture, was not a satisfactory ration (La. Sta. Bul. 227). In the second series cottonseed hulls fed with a high protein grain, silage, and oyster shell flour were found superior to upland grass hay, about equal to choice Bermuda hay, and inferior to mixed clover hay for winter milk production (La. Sta. Bul. 238). In tests now under way, an all-Louisiana ration of cottonseed meal, or soybean oilmeal, yellow corn, oyster shell flour, molasses, and silage appears more economical than a more complex ration containing several feeds and legume hay. Shrimp meal is also being compared with cottonseed meal.

Three years' results with cows on pasture and good roughage with no grain, little grain or half grain ration indicate the milk production to be 60, 85, and 90 per cent respectively of that on full grain feeding. This experiment clearly indicates that with a good milk market, grain can be fed liberally but at lower prices more economical production occurs with less grain and more roughage feeding (La. Sta. Bul. 241).

The average value of dry feed replaced by pasture at L. S. U. during the past four years averages over $35.00 per cow. These pastures averaged five and one-half tons of grass hay per acre which contained over 20 per cent protein in March and one-half as much protein in August. Over 500 grass samples show the same trend. More high protein grain should thus be fed in late summer than spring.

The feed cost of raising heifers to freshening, based on L. S. U. records and present prices, is about $70 where whole milk is sold and $40 when only cream is marketed. Replacing whole milk with skim-milk powder or skim-milk in surplus seasons and greater use of pasture for older heifers will reduce these costs, but only well-bred dairy heifers can be economically retained on most dairy farms.

At the North Louisiana Experiment Station, three years' results of grazing oats and vetch, rye, or barley, gave that respective rating. All gave a profitable increase of 3 cents per cow per day over no winter pasture. Sudan grass increased milk production 13.6 per cent over Bermuda, and 11 per cent over Kudzu pasture in three trials. In one trial green soybeans gave 2.3 pounds more milk per day than Sudan, showing the possibilities in maintaining good summer milk flow and raising a legume hay or green manure crop with one planting of seed.

Ten grade Jerseys used for experimental work with pastures have averaged over 300 pounds butterfat per cow during each of the past four years and returned $2.37 per day over feed, power, light, and milk hauling costs. This not only gave a good wage for labor but the land has been greatly improved during this time. The application of these results to the best one-third of the 41,000 cows in the 10 surrounding hill parishes would mean more than a quarter million dollars to the owners.

Permanent pasture at this station top dressed with 400 pounds of a 4-10-5 fertilizer averaged for three years 3,278 pounds hay; without nitrogen, 2,248 pounds, with phosphorus only 1,533 pounds, and unfertilized, 1,071 pounds. Results obtained with J. L. Fletcher at Lafayette the past three years gave 15.6 per cent more hay on limed than unlimed pasture, 43.5 per cent increase with nitrate of soda, and 46.6 to 180 per cent increase with nitrate and superphosphate. The average value at 30c per pound butterfat of the increase over feed and fertilizer costs for the latter treatment over unfertilized pasture in five trials were $26.00 per acre. The addition of nitrate and superphosphate is thus proved profitable for similar pasture when the market is 20c per pound butterfat or above. Superphosphate increased pasture growth one-third at the Hammond station.

Other dairy research includes studies on the cost and value of dairy bulls, feed costs of milk production, sweet potatoes for milk production, mineral deficiency of pasture grasses and dairy cattle. These results are available to aid in reducing the cost of production in dairy farming.

HORTICULTURE

Irish Potato Investigations. Results obtained from fertilizer experiments have established with fair accuracy the nutrient requirements of the Irish potato in the state. The best size of seed piece to use and the proper spacing in the row have been determined. These findings are estimated to be worth $500,000 to the growers in saving on cost of seed and fertilizer to those using excessive amounts and increased profits due to increase in yields where insufficient amounts were used.

Experiments carried out in cooperation with the Cuba Agricultural Experiment Station have demonstrated the superiority of Louisiana Junior Certified seed over Canadian seed, which has been used in the Island. As a result of this investigation, 30 cars of seed, worth $18,000 have already been sold so far this season in Cuba, Panama, Hawaiian Islands and in Florida. This will be an excellent outlet for the smaller potatoes which in seasons of low prices are a drag on the market and the farmer usually nets around 25 to 50 cents a hundred. This year from the above sales the farmer will net around $1.10 per hundred for his potatoes. This is the accomplishment of only one year's work.

Cabbage Investigations. An outstanding strain of the Copenhagen Market variety has been developed. Due to uniformity and high percentage of marketable heads produced, this strain will increase salable cabbage by 25%. In Louisiana the annual value of cabbage grown as a truck crop is about $300,000.

Fertilizer tests have shown that with proper fertilization cabbage yields can be economically increased by approximately 50%.

Improvement work has been carried on with the collard. One hundred pounds of improved seed have been distributed over the state. This stock is so much superior to anything on the market at the present time that growers are already demanding a large increase of this seed for their next year's crops.

Pepper Breeding (Hot). Uniform strains of Long Red Cayenne and Tabasco peppers have been developed. Thirty pounds of seed were distributed this year and for next season over 150 lbs. will be available to the growers. The improved strain of Cayenne produces about twice the yield of marketable peppers as compared with that commonly used. It is estimated that these strains will be worth about $200,000 to the pepper industry of the state.

Shallot Breeding. Shallots have been grown from seed and sets thus produced to the amount of one ton which were free from pink root were distributed to growers. Superior strains have been selected. This work means a great deal to the shallot industry and is estimated to be worth $25,000 annually.

Bean Investigations. Fertilizer, spacing and variety experiments have been conducted. Where beans followed a legume crop, turned under, in the fall, no fertilizer was necessary. Heavy applications of fertilizer are not necessary in the spring. This is one of Louisiana's leading truck crops for both spring and fall shipments and results of these investigations have been estimated to be worth $50,000.

Sweet Potato Investigations. For the past four years this Department has been carrying on investigations with the fertilization of sweet potatoes. We have found that a small application of fertilizer, say 400 lbs. per acre, will increase the average yield in the commercial sweet potato district by 100 bushels of U. S. Number 1's per acre. This means that the growers who follow the Station's recommendations could increase their average yield of potatoes by at least a fourth more than what they have been obtaining heretofore. Another important phase of sweet potato investigations has been selecting high yielding strains. We have made substantial progress along this line. This season we have grown a considerable lot of this selected seed to be distributed among the farmers of the state at cost of production. We will probably have around 400 bushels this year. This improved seed gives 20 to 25% increase over the potatoes now used for seed. Besides being high yielders, our potatoes are free from disease and insects. Heretofore the farmers have not had a place where they could buy seed potatoes of reliable origin. This work is valued at $200,000 to the farmers of the state.

PARASITOLOGY

The work of the Department of Parasitology deals with the prevention and treatment of parasitic diseases of domestic animals. An extensive study of coccidiosis in chickens has been carried out, and some experiments on some of the newer drugs used in the removal of parasites have been conducted testing their action on the worm parasites of chickens.

Coccidiosis is most common among growing chickens and frequently causes mortality from 50% to 100% in natural epidemics. Many of the individuals that survive the disease are left in an unsalable and unthrifty condition for months after the epidemic. Study of this disease at this station has been chiefly concerned with the following facts:

1. A study of the various stages of the organism shows that often it reaches the infective stage in less than 24 hours after being passed in the droppings of infected birds. This makes necessary the cleaning of brooder houses, in which litter is used, every day instead of once or twice a week, as is the common practice, in order to prevent epidemics of the disease.

2. The effectiveness of disinfectants has been studied as a means of controlling outbreaks in brooderhouses. The results show the organisms are very resistant to the action of the economical disinfectants in common use. Lye, formaldehyde, and carbolic acid have been found ineffective and should not be relied on to prevent outbreaks of the disease. Iodine suspensoid has been found effective in killing the cysts but this preparation is much too expensive to be economically used. The use of properly constructed wire floors and the strict application of sanitation to the construction of mash feeders and drinking fountains can be relied upon to prevent the occurrence of the disease.

3. Economic losses from coccidiosis have been found to occur as follows:

A. Deaths: Under the carefully controlled conditions of the experiments it has been found that 22.7% of the 671 inoculated chickens died from the disease. Almost 91% of the total number of deaths occurred on the 5th, 6th, and 7th days after infection, and almost all of the remainder died as a result of becoming chilled. It has been found that deaths can be reduced by supplying the sick birds with heat and by keeping them entirely quiet until they have recovered.

B. Weight: Economically, the loss in weight in birds having the disease at 7 weeks of age varies from 15% to 5% in the two sexes at various times up to 3 months after the occurrence of the epidemic. In some lots, 10% of the survivors were still unsalable three months after the epidemic. Poultrymen can save feed and expense of care by removing and disposing of birds that are still unthrifty two to four weeks after the outbreak of the disease.

C. Egg-production: It has been found in these experiments that severely affected pullets that had the disease at 7 to 8 weeks of age laid 45.5% less eggs over a year period than other birds of the same lots which did not have the disease. Also they began to lay 6.5 weeks later than the uninfected birds. It is believed that losses from this source can be largely reduced by eliminating the birds that are still unthrifty three to four weeks after the outbreak of the disease.

It is believed that the increased profits from the resulting healthy birds will quickly repay any poultryman for the extra expense of providing the necessary equipment to prevent infection from the organisms causing this disease. For the small poultry raiser who uses hens for brooding, confinement in a small wire covered pen, which is moved daily to a fresh, new grass plot, is recommended. The object to be attained in the methods adopted is to prevent the chickens from picking up the organisms causing the disease in contaminated feed or drinking water. Poultrymen must remember that regardless of the method adopted that these organisms become infective within 24 hours after being passed in the droppings.

4. A microscopic study of the walls of the regions of the digestive tract attacked by the organisms causing coccidiosis indicates that the damage done by them is not repaired by nature in a normal manner, and explains the reasons for the unthrifty condition and unprofitableness of the severely affected birds. This also indicates the probable uselessness of treatment and emphasizes the importance of prevention and the elimination of the severely affected birds. The use of powdered buttermilk, so widely recommended, has been found of no value.

5. Age resistance or immunity to coccidiosis: It is a common belief among poultrymen that if chickens are raised successfully to the age of ten to twelve weeks that they are resistant to coccidiosis. It has been found in these experiments in which birds of all ages up to 8 months have been inoculated that they are susceptible at any age, and that preventative measures should be continued throughout the life of the birds.

6. Inherited resistance or immunity to coccidiosis: The results of these experiments show a wide difference in the severity of the disease in different families of the inoculated birds and suggests the possibility of breeding resistant strains.

The effectiveness of certain drugs in the removal of parasites from chickens has been under investigation by the Department of Parasitology. In practice it has been observed that the preparations in common use have two disadvantages: 1, they are more or less ineffective in the removal of the parasites; and 2, they are toxic and cause loss in egg-production. Two new drugs have been studied, namely hexylresorcinol and normal butylidene chloride. The experiments completed indicate that normal butylidene chloride is almost 100% effective in the removal of the parasites and that it has no harmful effects upon the chickens.

PLANT PATHOLOGY

Sugar cane has been for a long period one of the principal agricultural crops of Louisiana and the prosperity of the southern part of the state depends on it to a very large extent. As a result of a number of factors, the most important of which is the attack of three diseases, root rot, red rot and mosaic, the sugar industry declined to such an extent that a crisis resulted. Many plantations have been lost to the growers and most of the others are heavily mortgaged.

At the present time, the sugar industry is on the road to recovery and many plantations are making money in spite of the present depression with the very low prices. This recovery has been brought about very largely by the research work of the Louisiana Agricultural Experiment Station and of the United States Department of Agriculture. This has been brought about by the substitution of varieties and by certain modifications in cultural methods and procedure.

The department of plant pathology has cooperated to a very material extent in this work. Much information has been procured concerning the diseases and the physiology of the root system of cane. This information has been the basis for the recommendations regarding the cultural methods. Also, as new varieties have been introduced, information has been obtained rapidly regarding their susceptibility to disease. This information has permitted the early discarding of unsatisfactory varieties and has also shown that some of the varieties being planted on a large scale are dangerous canes which may fail under certain conditions. The latter canes are gradually being replaced. Such information will prevent the occurrence of another crisis in the sugar industry.

DEWBERRY AND BLACKBERRY ROSETTE

Although climatic conditions are very favorable, it has been impossible to grow blackberries and dewberries in Louisiana on a commercial basis because of the rosette or double blossom disease. These fruits should become very important in this state. If they could be grown economically, the berries could be put on the market immediately after the strawberry shipping season closes. This would mean that the period of shipping small fruits in Louisiana would be extended for another six weeks.

Research work during the past two years in the department of plant pathology has given information which will be very valuable in controlling the rosette disease. It has been found that infection takes place a year before the disease becomes visible and only on the young canes, the ones that produce the fruit the following year. Based on this fact, control measures which include spraying and the cutting back of the young shoots are being formulated which offer great promise and it now seems very probable that dewberries and blackberries can in the future be grown on a commercial scale.

STRAWBERRY DISEASE INVESTIGATIONS

A few years ago, the strawberry industry showed signs of a rapid decline. Old fields and districts were failing and the industry was being maintained by extension into new areas. One of the principal causes of the decline was the presence of certain diseases, among which were the leaf spot and scorch. To control these diseases, a system of spraying has been formulated by the department of plant pathology which has given remarkable results. This system was based on information on the life history of the disease organisms and the relation of these to our climatic conditions, information which had been previously obtained by our research investigations. Spraying with Bordeaux mixture from seven to eight times during January, February, and early March when conditions are most favorable for the spread of the disease has resulted in almost complete control. This increases the money value of the crop from $50.00 to $200.00 per acre. These control measures are being practiced at the present time to a very large extent by the strawberry growers and this practice has been a large factor in the continuation of the strawberry industry in Louisiana.

TOMATO WILT

In the past, the tomato wilt has been a very serious disease in Louisiana. Some sections of the state could not grow tomatoes. Some years ago, the department of plant pathology started breeding work to obtain a variety resistant to the disease. Two varieties were obtained, the Louisiana Red and the Louisiana Pink, which would produce crops in sections where tomatoes had not been grown for years. These were some of the first wilt resistant varieties produced in this country. These tomatoes are still being grown in Louisiana, Texas and neighboring states on a large scale, as they will produce more than other varieties. Of more importance, however, is the fact that these varieties are being used in a number of places for breeding stock for more satisfactory wilt resistant varieties. They seem to carry the characters of wilt resistance and heat resistance to a greater extent than any of the other varieties now on the market.

POULTRY

STORAGE OF LOUISIANA EGGS

The use made of experimental results in storing Louisiana eggs is illustrated by the experience of a nearby poultryman. This man produced an abundance of high quality eggs for which he had a satisfactory market, except during the season of flush production. Basing his judgment upon the results of five years work at the Louisiane Experiment Station, he stored 400 cases of low priced spring eggs, and sold them at a profit of five cents per dozen, or a net gain of $600.00 for one season. It is estimated that if all surplus spring eggs of Louisiana were stored a profit of $300,000 might be realized by poultry keepers of the state. Bulletin 229, of the Louisiana Agricultural Experiment Station, gives the detailed results of egg storage studies made at this station.

USE OF RICE BY-PRODUCTS IN POULTRY RATIONS

Louisiana imports a goodly percentage of the feedstuffs used in poultry rations. An urgent need exists, therefore, that locally produced feedstuffs be utilized to the best advantage. With this in mind, experimental work was conducted with growing chicks and with hens in order to determine the value of rice by-products as feeds for poultry. This work has determined conclusively that rice bran, rice polish, and brewer's rice can be utilized with equally good results to replace higher priced wheat, oat and corn products in growing rations and laying rations. Use of rice by-products reduces the cost of poultry rations 10 to 30%, which may well be the margin between profit and loss with the poultry flock. Louisiana Agricultural Experiment Station Bulletin 243 presents detailed results of experiments with rice by-products.

SHRIMP MEAL, A PROMISING PROTEIN SUPPLEMENT

Preliminary tests in which shrimp meal, a local product, is used as a protein concentrate to replace meat scraps (produced outside the state) indicate that satisfactory results may be obtained with shrimp meal in growing rations and laying rations. If further experiments substantiate these results, which is probable, the use of shrimp meal will result in a tremendous saving in feed costs. Meat scraps sell retail for $2.50 to $4.50 per cwt., while shrimp meal sells for $1.00 to $1.50 per cwt.

Rearing Chickens in Confinement

Coccidiosis, a disease of young chickens, was resulting in the loss of thousands of dollars to poultry raisers in every parish of the state. Internal parasites stunted growing birds and lowered egg production in the laying flock. A practical method of control of these menaces was demanded by poultrymen of the state. As a result, experiments have been conducted in which chickens have been grown and kept under a variety of conditions and a plan of management developed which does much to control these losses.

The use of wire floors in the brooder houses, rotated growing ranges and rotated yards for the layers has greatly diminished the losses resulting from coccidiosis and internal parasites. If a movable laying house is used and the birds range over the farm, the house should be moved to a new location several times each year.

BLACKSTRAP MOLASSES IN POULTRY RATIONS

On the basis of limited tests blackstrap molasses appears to have possibilities as an ingredient for poultry rations to replace higher priced grain products. Molasses is being tested in growing rations, laying rations and fattening rations.

HATCHABILITY STUDIES

The problem of reproducing the flock with greatest efficiency is of paramount importance to all poultry keepers. Under existing conditions it is necessary to set at least fifty per cent more eggs than the number chicks expected. Extensive examinations of eggs that failed to hatch have shown that breeding is a very important factor in hatchability. These examinations in connection with inheritance studies listed below have made possible the elimination of certain inherited defects from the breeding stock.

Inheritance Studies

Permanent improvement of the poultry flock is dependent upon the establishment in the breeding stock of desirable inherited characters and the perpetuation of these desirable traits from generation to generation. Conversely undesirable characters must be eliminated from the breeding stock. Much remains to be learned concerning inheritance in poultry and progress is necessarily costly and slow. Several undesirable characters such as dwarfism, "crippled" chicks, malpositions of embryos and an embryonic sex-linked lethal gene (which kills one-half of the females) have been identified and steps are being taken to eliminate these undesirable characters from the breeding stock.

The possible linkage of certain inherited morphological characters and of desirable economic qualities is being studied.

Electric Heat for Battery Brooders

The advent of battery brooding in recent years has given great impetus to the use of electricity for heating brooders and questions as to power consumption have arisen. Electric power is now available to many Louisiana farmers at fairly reasonable rates. Based upon a usable capacity rating (about 21 sq. in. per chick) the average power consumption per chick brooded in battery brooders, in a room with supplemental heat, was as follows:

	February	March	April	May	Average for season
K. W. H. per chick brooded to 3 wks. age	.87	.80	.75	.72	.79
K. W. H. per chick brooded to 4 wks. age	1.29	1.19	1.10	1.06	1.16
Average room temperature	76.8	77.6	79.2	80.5	77.9
Minimum temperature any one day	69.5	72.0	74.0	77.0	

These figures are somewhat higher than those given for previous experiments and by manufacturers but the difference is due to chick capacity rating rather than to excessive power consumption,

SUGAR STATION

CANE VARIETIES

The sugar industry in Louisiana reached its high point in 1904 when the crop was 398,194 short tons of sugar and the yield per acre is recorded as 26 tons. Shortly after 1904, due to an unfavorable Government attitude, the sugar industry began a slow decline, but the yield per acre continued to average around 20 tons of cane. About 1917 a complication of diseases was found attacking the sugar cane crop of this State and this condition continued until in 1926 the crop consisted of only 47,000 short tons of sugar and a yield of 6.8 tons of cane per acre. At about this time the P. O. J. canes were introduced into commercial plantings, and the effect of these disease-resisting canes upon production was that in 6 years the crop had increased until in 1932 it was 222,760 short tons of sugar and the yield of cane per acre was 15.5 tons. There were three varieties of the P. O. J. canes given to the sugar planter.

One of them, P. O. J. 234, was found to yield satisfactory plant cane crops, but was poor as a stubble cane variety. However this variety matured early and gave the most satisfactory returns of sugar per ton of cane.

The second of these varieties, P. O. J. 213, which for a while was most popular because of the satisfactory yields of cane and fairly good returns at the mill, soon proved susceptible to red rot and root rot and had to be largely abandoned.

The third of these canes, namely P. O. J. 36, was found satisfactory on certain types of soil, but as a general thing was entirely too late in maturity for large scale use.

Had there been no intensive investigational work on varieties of sugar cane, the P. O. J.'s would not have been capable of sustaining our industry. Fortunately both the United States Department of Agriculture, through its Office of Sugar Investigations, and the Sugar Experiment Station of the Louisiana State University were at work on this problem, and the sugar planters due to this investigational work now have four other varieties of cane which are rapidly taking the place of the original P. O. J. canes. The 1934 crop will be very largely grown from these newer varieties, which are superior in yield of cane per acre and equal to the P. O. J's in sugar per ton. It is not unreasonable at all to predict that the sugar crop in Louisiana after this year will increase from about 15 tons to 20 tons per acre.

For quite a number of years the price of sugar has been below normal, and profits from sugar plantations have been hard to make. If no other investigational work were done, the sugar industry would certainly be standing blindfolded on the edge of a precipice.

Fortunately for the sugar planters, the work of the two above mentioned agencies has been continued, and there are plantings of four additional new varieties of cane on some seventy or eighty plantations where seed cane of the most valuable varieties ever grown in Louisiana will be produced in 1934 for general distribution to the sugar planters of the State. These four varieties are all resistant or immune to the diseases which have proved so injurious to the cane of this State. They produce good tonnage, and yield a juice far richer than any that Louisiana has ever known.

The greatest handicap that the sugar industry of this State labors under today in its build-back to the days of old is the lack of sufficient milling capacity to take care of additional cane. One of the new varieties, namely C. P. 29-320, is extremely early in maturity. During the past three years tests at the Sugar Experiment Station of the University have shown this cane to be rich enough for profitable milling by the first of October. During recent years our mills have been forced to wait until the fifteenth of October or even the first of November for the P. O. J. canes to mature. This delay has reduced our normal mill run from 90 to 60 days. The value of this early maturing cane can be appreciated by turning back to the year 1929 when there was a very heavy crop of P. O. J. 213 which was not ripe enough for milling until November 1. During the early December of that year a severe freeze occurred followed by extremely bad weather in January. On account of the weather and the late start, some of our largest plantations lost fifty per cent of their crop which could have been saved if the cane had been mature enough for milling by October 1.

SOILS

Remembering that the sugar industry went through a very long period of declining yields, it is but natural to find that the land owners allowed the fertility of their soils to go down. Lack of soil fertility played an important part in the disease situation which was so disastrous in the twenties .

The Experiment Station at Baton Rouge conducted soil building experiments and discovered that the sugar belt soils could be built back to maximum productivity in two years by rotation with legume crops, particularly the soybean, when these legume crops were turned under. Under a well balanced rotation program the yields of cane at the Sugar Experiment Station have about doubled the average yield of the State for the past three or four years. The value of this work to the sugar industry can probably be best appreciated when it is known that the State Intermediate Credit Association two years ago made it mandatory that cane growers wishing to borrow through that organization carry out the recommendations in regard to rotation which were made by the Sugar Experiment Station. The results of this soil investigation not only enabled the production of better crops, but where it is practiced it has been found unnecessary to use any commercial fertilizer on plant cane and that less fertilizer for stubble cane is required.

The savings of the sugar planters in their fertilizer bills would be sufficient to repay several times the appropriation for all of the investigational work done in the State.

One of the heaviest expenditures necessary to be made in raising sugar cane is feed for the livestock. The Sugar Experiment Station has found that a small dosage of nitrogenous fertilizer on corn following stubble cane turns the corn crop from practically a failure to a profitable crop. In addition the use of readily available nitrogen on the corn crop hastens the maturity of the corn, thereby giving the sugar planter a better chance to harvest the crop and get his land into good shape for fall planted sugar cane.

FINANCIAL REPORT, AGRICULTURAL EXPERIMENT STATIONS

LOUISIANA STATE UNIVERSITY

July 1, 1931 — June 30, 1932

	State Fund	Fert. & Feed Fund	Special Sugar Cane Fund	Hatch Fund	Adams Fund	Purnell Fund	Delta Station Fund	American Cyanamid Fund	Chilean Nitrate Fund	Grasselli Chem. Fund	M. V. Potash Holland School Fund	TOTAL
RECEIPTS												
Balances July 1, 1931	586.25	1,529.42	17,271.90				54.66	695.41	358.64	999.00		21,495.28
State Appropriations	50,000.00		14,500.00				10,000.00					74,500.00
Sales	17,760.34	6.12	118.87		.30		139.78					18,025.41
Industrial Fellowships								2,000.00	508.79		1,000.00	3,508.79
Interest on Bank Balances	540.24											540.24
Miscellaneous	2,345.62					13.24						2,358.86
Commissioner of Agriculture		20,939.69										20,939.69
U. S. Government Appropriations				15,000.00	15,000.00	60,000.00						90,000.00
TOTALS	71,232.45	22,475.23	31,890.77	15,000.00	15,000.30	60,013.24	10,194.44	2,695.41	867.43	999.00	1,000.00	231,368.27
DISBURSEMENTS												
Salaries	33,452.91	18,861.80	24,513.91	6,803.14	11,438.33	41,895.80	3,600.00	1,350.00	499.98			142,415.87
Labor	17,796.48	4,763.56	4,087.68	5,387.46	1,420.38	9,205.70	2,365.40		29.11	621.80	361.54	46,039.11
Stationery and Office Supplies	417,75	31.83	133.42	25.97	18.46	428.25	16.00		9.40		22.82	1,103.90
Scientific Supplies Consumable	35.35	891.40	149.18	138.22	531.02	324.40			17.78	.66		2,088.01
Feeding Stuffs	1,244.73	117.20	100.00		811.24	1,685.07					26.00	3,984.24
Sundry Supplies	1,845.15	252.93	161.02	255.96	85.00	667.34	349.22	40.00	21.23		5.92	3,683.77
Fertilizers	936.03	333.40	113.56	208.42		185.24			48.00			1,824.65
Communication Service	543.17	36.60	76.67	6.33	.80	262.51	71.67		.35		20.71	1,018.81
Travel Expenses	2,428.58	177.32	2,424.88	177.31	165.71	1,252.20	64.18	995.45	245.43	118.12	293.46	8,342.64
Transportation of Things	518.14	115.59	226.36	48.44	38.87	199.50	680.15		31.41	.95	17.81	1,877.22
Publications	105.30	4.64	392.72	1,601.63								2,104.29
Heat, Light, Water and Power	1,054.60	687.65	190.68	79.55	49.96	351.39	253.88				2.51	2,670.22
Furniture, Furnishings and Fixtures	171.26	44.07	181.91			54.01						451.25
Library	22.17	34.00			7.50							63.67
Scientific Equipment	41.98	85.98	4.15	.82	418.71	55.47						607.11
Live Stock	404.57				4.32	1,674.32	4.10					2,087.31
Tools, Machinery and Appliances	1,172.17	58.68	759.40	259.95	10.00	964.84	525.17				7.07	3,757.28
Buildings and Land	2,045.95	785.45	92.40	6.80		344.00	94.33					3,368.93
Contingent	772.06	206.90	3.15			463.20	235.69					1,681.00
TOTALS	65.008.35	27,489.00	33,611.09	15,000.00	15,000.30	60,013.24	8,259.79	2,385.45	902.69	741.53	757.84	229,169.28
Balances June 30, 1932	6,224.10	5,013.77	1,720.32				1,934.65	309.96	35.26	257.47	242.16	2,198.99
	71,232.45	22,475.23	31,890.77	15,000.00	15,000.30	60,013.24	10,194.44	2,695.41	867.43	999.00	1,000.00	231,368.27

FINANCIAL REPORT, AGRICULTURAL EXPERIMENT STATIONS
LOUISIANA STATE UNIVERSITY
July 1, 1932 — June 30, 1933

	State Fund	Fert. & Feed Fund	Hatch Fund	Adams Fund	Purnell Fund	N. E. La. Station	American Cyanamid	Chilean Nitrate	Grasselli Chemical	N. V. Potash Holland Scholarship	TOTAL
RECEIPTS											
Balances July 1, 1932	4,503.78	5,013.77				1,934.65	309.96	35.26	257.47	242.16	2,198.99
State Appropriations	83,202.00					9,468.00					92,670.00
Sales	11,211.47					34.00					11,245.47
Industrial Fellowships							800.00			1,000.00	1,800.00
Miscellaneous	518.68										518.68
Commissioner of Agriculture		20,538.80									20,538.80
U. S. Government Appropriations			15,000.00	15,000.00	60,000.00						90,000.00
TOTALS	99,435.93	15,525.03	15,000.00	15,000.00	60,000.00	11,436.65	1,109.96	35.26	257.47	1,242.16	218,971.94
DISBURSEMENTS											
Salaries	57,596.56	13,188.75	7,475.00	11,863.33	42,449.96	3,600.00					136,173.60
Labor	21,464.79	2,426.21	4,087.49	1,328.05	9,157.98	2,390.93	750.00		229.25	390.55	42,225.25
Stationery and Office Supplies	256.63	81.24	310.42	7.73	290.03	20.25					966.30
Scientific Supplies Consumable	827.44	1,043.98	27.54	699.40	556.47					41.76	3,196.59
Feeding Stuffs	1,847.13	70.30	2.10	480.65	1,023.71	10.10					3,433.99
Sundry Supplies	1,549.08	210.61	110.87	63.39	414.66	460.09					2,808.70
Fertilizers	841.40	233.57	203.54		286.26	72.90					1,637.67
Communication Service	591.22	23.75	187.90	13.85	101.42	92.51	2.45			1.97	1,015.07
Travel Expenses	3,656.87	33.04	463.18	48.68	927.09	62.47	346.14		28.22	173.77	5,739.46
Transportation of Things	861.08	94.90	33.28	59.59	288.01	7.00				5.54	1,349.40
Publications	295.54		1,458.10		242.79						1,996.43
Heat, Light, Water and Power	2.005.12	205.27	66.35	33.30	406.76	414.87					3,131.67
Furniture, Furnishings and Fixtures	125.72		96.48		88.29						310.49
Library	17.15	30.22		5.00	2.25						54.62
Scientific Equipment	29.15	251.79	74.75	224.85	201.60						782.14
Live Stock	745.29			56.00	183.00						984.29
Tools, Machinery and Appliances	1,888.18	24.79	342.51	29.10	2,144.10	334.01					4,762.69
Buildings and Land	3,625.48	74.98	20.50	87.08	324.94	64.33					4,197.31
Contingent	1,139.97	15.75	39.99		910.68	324.90				11.20	2,442.49
TOTALS	99,363.80	18,009.15	15,000.00	15,000.00	60,000.00	7,854.36	1,098.59		257.47	624.79	217,208.16
Balances June 30, 1933	72.13	2,484.12				3,582.29	11.37	35.26		617.37	1,763.78
	99,435.93	15,525.03	15,000.00	15,000.00	60,000.00	11,436.65	1,109.96	35.26	257.47	1,242.16	218,971.94

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